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Gyotaku:

Its Origins and Relationship with Art and Science

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Tese de Doutoramento

Orientação:

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Dedication

For my father Pat Scholes who saw this voyage begin but not end

and

for the love and support throughout of my mother Lily and my brother Karl.

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Summary

This study explores the origins and history of *gyotaku* techniques from their possible beginnings in the early 1800's until today. The nature of the relationship between *gyotaku*, art and science is investigated in terms of printmaking and print culture, the art of fishing and natural history illustration. The development and spread of *gyotaku* from Japan to America and the rest of the world is traced and analysed taking into consideration the coherence between the techniques of the *gyotaku* print (such as its materials, tools and methods of production); the subject matter, the aesthetics, 'style' or outward appearance of the compositions; the *gyotaku* practitioners and those who commission *gyotaku* prints; the effects and significance of particular cultural perspectives; the diversity of disciplines in which *gyotaku* is currently encountered and the prevailing interest in animal welfare, environmental issues and 'safer practices' within printmaking.

The paucity of information concerning *gyotaku* in English and the generalisations and contradictory data relating to its origins and history which is found in the existing information, coupled with the fact that *gyotaku* is frequently categorised under the generic term 'nature printing' and yet it has its own distinct characteristics, unique printed results and its origins are in the Far East (unlike the European based 'nature printing') are factors which indicate that this is a subject worthy of study in its own right. Although the Internet features some information about contemporary *gyotaku* practitioners several of the most influential persons do not have websites and references to their work or available images are limited. Hence the data examined and included in this study comes from diverse literature and non-text based sources as well as personal communications with individuals and groups. Each chapter establishes a rationale which links *gyotaku* to the different facets of its relationship with art and science and its interdependence upon particular materials such as certain types of paper and ink as well as establishing the fact that *gyotaku* provides a versatile, accessible, 'eco-friendly' and relatively in-expensive printing process

which does not require a printing press and is suitable for printing a range of natural specimens and man-made items.

This study makes a significant contribution to the existing body of work concerning *gyotaku* which is currently available in English. It questions the preconceived idea of *gyotaku* as a 'fish print' in the light of contemporary practice evident from the 1950's onwards which embraces a wide range of subject matter. In conclusion I suggest that the importance of the relationship between the techniques, materials, subject matter and the cultural context is recognised. Not only have these factors influenced the origins of *gyotaku*, its development and aesthetics but they have also played a significant role in the techniques spread from Japan to the USA and formed the basis of its use in a wide range of disciplines. Based upon the diversity of works produced by contemporary *gyotaku* practitioners I propose the adoption of a modern definition of *gyotaku* which, similar to other printmaking processes, is not dictated by the subject matter that is printed. I also suggest that a fourth method of *gyotaku* and the most recent development is recognised, called the 'Hawaiian' *gyotaku* technique or method. The application of the ink, the finishing process and the results are significantly different from the traditional direct *gyotaku* although there are similarities in the printing stage. Both theoretically and empirically this study confirms the importance of *gyotaku* as a contemporary printmaking process.

Resumo

Este estudo explora as origens e história das técnicas *gyotaku* das suas possíveis origens no início dos 1800's até hoje. É investigada a natureza da relação entre *gyotaku*, arte e ciência em termos de técnica de impressão e cultura de impressão, a arte da pesca e ilustração da história natural. É traçado o desenvolvimento e expansão do *gyotaku* do Japão para a América e para o resto do mundo e analisado tendo em consideração a coerência entre as técnicas e impressão do *gyotaku* (como os seus materiais, ferramentas e métodos de produção); o assunto, a estética, o "estilo" ou aparência externa das composições; os praticantes de *gyotaku* e aqueles que encomendam impressões *gyotaku*; os efeitos e significado de perspetivas culturais particulares; a diversidade de disciplinas em que se encontra atualmente o *gyotaku* e o interesse prevalente em bem estar animal, assuntos ambientais e "práticas mais seguras" de produção de impressões.

A pobreza de informação relativa ao *gyotaku* em English, assim como as generalizações e dados contraditórios sobre as suas origens e história, conjuntamente com o *gyotaku* ser frequentemente categorizado sob o termo genérico de "impressões de natureza", e no entanto tem as suas características distintas, resultados de impressão únicos e as suas origens no Extremo Oriente (em contraste com a "impressão de natureza" europeia), são fatores que indicam que é um assunto que vale a pena estudar por direito próprio. Embora a Internet contenha alguma informação sobre praticantes de *gyotaku* contemporâneos algumas das pessoas mais influentes não têm sítios na Internet e as referências ao seu trabalho ou imagens disponíveis são limitadas. Daí que os dados examinados e incluídos neste estudo venham de literatura diversa e fontes não textuais assim como comunicações pessoais de indivíduos ou grupos. Cada capítulo estabelece uma lógica que liga o *gyotaku* a facetas diferentes da sua relação com a arte e a ciência, e a sua interdependência de materiais particulares, como seja certos tipos de papel e tinta, assim como o *gyotaku* ser uma forma versátil, acessível, "amiga do ambiente" e relativamente pouco dispendiosa do processo de

impressão que não requer uma prensa e pode ser utilizado para imprimir uma variedade de espécimes naturais e feitos pelo homem.

Este estudo faz uma contribuição significativa para o conjunto do trabalho que se refere ao *gyotaku* atualmente disponível em inglês. Questiona a ideia pré-concebida de que o *gyotaku* é a "impressão de peixes" à luz da prática contemporânea evidente a partir dos anos 1950's que abraça um conjunto largo de objetos. Em conclusão, sugiro que a importância da relação entre técnicas, materiais, objeto e contexto cultural é reconhecido. Não só estes fatores influenciaram as origens do *gyotaku*, o seu desenvolvimento e estética, mas também tiveram um papel importante nas técnicas que se expandiram do Japão para os Estados Unidos e formaram a base para o seu uso num vasto grupo de disciplinas. Com base na diversidade dos trabalhos produzidos pelos praticantes contemporâneos de *gyotaku* proponho a adoção da definição moderna de *gyotaku* que, por analogia a outros processos de produção de impressão, não é ditado pelo objeto que é impresso. Também sugiro que seja reconhecido um quarto método de *gyotaku*, designado por método ou técnica "Havaiano". A aplicação de tinta, o processo de finalização e os resultados são significativamente diferentes do *gyotaku* direto tradicional se bem que com semelhanças no estádio de impressão. Quer teoricamente, quer empiricamente este estudo confirma a importância do *gyotaku* como um processo de impressão contemporâneo.

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Glossary of Terms and Abbreviations

ASTM – American Society for Testing and Materials.

Bokutaku – A Japanese word for an impression made by a rubbing technique.

Chine collé – A collage technique in which papers are used to create localised areas of colour and/or texture.

Chokusetsu-ho – A Japanese word for the 'direct' *gyotaku* printing technique.

CIAC – Cephalopod International Advisory Council.

CITES – Convention of International Trade of Endangered Species.

CMYK - Cyan Magenta Yellow and Key-line (Black). Cyan, magenta and yellow are subtractive primaries identified as the opposite to red, green and blue (additive primaries). The key-line colour which holds these together is always black.

Cyanotype - A photographic printing process discovered by Sir John Herschel (1792 - 1871) also called 'Sun Prints' or 'Blue Prints'. Cyan blue coloured prints are made from a mixture of ammonium iron (III) citrate and potassium ferricyanide.

Daimyo – A Japanese word for the territorial Lords of pre-modern Japan.

3-D Printing – Also known as 'Additive Manufacturing' (AM) is a printing process in which layers of a material are laid down (printed) to make a three-dimensional object of any shape from a digital model.

Embossing – A firm impression made onto paper from a relief block. When the block is not inked it is called 'blind embossing'.

Engraving – An image cut into metal (intaglio) or wood (relief) using a variety of tools such as gravers, burins, etc. Copper-plate engravings were often used for European natural history illustrations.

Etching – An intaglio print process in which acid or another chemical is used to bite an image into a metal plate, generally, copper, steel, zinc or aluminium.

Giclée – A digital printing process for producing fine art prints either in editions or unlimited editions. The information is stored on digital files so that prints can be made on demand.

GNSI – Guild of Natural Science Illustrators.

Gyotaku-no-kai – A Japanese word for the Association of *gyotaku* artists (sometimes called the friends of fish print).

Haiku – A very short Japanese poem consisting of 17 *on* (phonetic units) in three phases of 5, 7 and 5 receptively.

Hanko – A Japanese word for a seal or 'chop mark' often printed in red on a print.

Intaglio – A printing process in which the image to be printed is made below the level of a metal plate, by means of etching, engraving or scratching.

IAPMA – International Association of Hand Paper Makers and Paper Artists.

IGFA – International Game Fish Association.

IPCNY – International Print Center New York

Kabuki – A Japanese word which can be translated as 'The Art of Singing and Dancing' and is a form of classical dance drama in which the performers wear elaborate costumes and make up.

Kakejiku – A Japanese hanging scroll.

Kami – A Japanese word for the spirits or phenomena that are worshipped as part of the Shintō religion.

Kansetsu-ho – A Japanese word for the 'indirect' *gyotaku* technique.

Kata – A Japanese word for a set pattern of movements which should be practised repeatedly either solo or in pairs.

Kendo – Means 'The Way of the Sword' and is a modern Japanese martial art which uses a bamboo practise sword, *shinai* and armour, *bogu.*

Lithography – A printing process developed by Alois Senefelder (1771-1834), which depends upon the mutual repulsion of grease and water. Lithography was made on limestone originally and later metal plates were introduced.

Matsuri – A Japanese word which means a celebratory festival. *Matsuri* originated from the Shintō rites intended to ensure peace, prosperity and purity.

Monoprint / Monotype – Various methods of printmaking which produce a unique print rather than an edition of prints.

MSDS – Material Safety Data Sheets. The American Health and Safety Standard for the workplace.

Nature Printing Society or NPS – An international organisation dedicated to the art and history of nature printing (including *gyotaku*).

Nihonga- A traditional form of Japanese style paintings based on traditions over one thousand years old and named in the Meiji period to distinguish from those works made in a Western style.

NOAA – National Oceanic and Atmospheric Administration. A scientific agency within the United States Department of Commerce.

Off Set Printing – refers to a printing process in which an inked image is transferred (or 'offset') from a plate onto a rubber blanket and then to a printing surface.

PPAC – is the standard abbreviation for Professor Emeritus Elizabeth Lewisohn Eisenstein's publication 'The printing press as an agent of change'.

Relief – A printmaking process in which the upper surface of a material such as wood or lino is inked-up and printed from.

Rubber Stamp- A printing process in which ink is applied to a 'rubber stamp' which consists of an image or text that has been carved, moulded, laser cut or vulcanised on to a sheet of rubber. The rubber is generally cut out and mounted onto a block for ease of printing.

Samurai – A Japanese word for the military nobles of medieval and early-modern Japan.

Sensei – A Japanese word for teacher.

Screen Printing – A printing process in which a stencil is made on a screen and the ink is pushed through the screen with a squeegee.

Shimenawa and *gohei* – ropes and white paper strips made from rice straw and washi hung to mark the area which leads from the profane to the sacred. Often seen in Shintō shrines and hanging around the trunks of trees.

Shintō – A Japanese word which translates as 'way of the gods', this refers to a religious tradition associated with the landscape, nature and the people of Japan.

Shogun – A Japanese word for the military governor or 'general' from 1192 until the end of the Shoguns rule in 1867.

Shōhyaku-sha – A group of Japanese men who were seeking a reliable way of seeing and creating representations of natural specimens without any evidence of the hand that made it.

SITES – Smithsonian Institution Travelling Exhibition Service.

Sumi – Traditional Japanese black ink in stick or liquid form.

Sumi-e – A Japanese ink wash painting.

Suminagashi – 'Spilled Ink', a type of Japanese marbling.

Takuhon – A Japanese word for a rubbing technique used for making impressions of stone memorials.

Tampo – An ink dabber used in indirect *gyotaku* for the application of ink and sometimes in direct *gyotaku* to blend inks together on the body or surface of the specimen.

Tengara – A Japanese word for a type of traditional Japanese fly fishing.

Tenkara – A Japanese word for a traditional type of Japanese fly fishing in which a bamboo rod and flies are used without a reel.

Tensha-ho – A Japanese word for the 'transfer' *gyotaku* technique, introduced by Hidenosuke Tanaka.

UNESCO – The United Nations Educational, Scientific and Cultural Organisation.

Washi – Japanese paper made by hand in the traditional Japanese manner.

Woodblock – A Japanese printing process in which the pigments are mixed with water and the registration marks (*kentō*) are cut onto each block. The block (*hangi*) is cut down the wood grain (traditionally cherry wood) rather than across it as in Western wood engravings. Modern Japanese woodblocks make use of special Japanese plywoods faced with cherry, basswood, magnolia, etc.

Yoshi – A Japanese word for foreign paper which came into use during the Meiji period.

Yumizu gyotaku – A group of people in Japan who are dedicated to the spread of the direct colour *gyotaku* technique as an art form.

1. General Introduction

The purpose of this study is to determine the answers to three main questions, firstly what are the origins and history of a printing process called *gyotaku.* This is closely aligned with an investigation into the traditional and contemporary materials and techniques used in *gyotaku.* Secondly, what is the nature of its relationship with art and in particular fine art printmaking. Thirdly, what is the relationship between *gyotaku* and science with regards to natural history illustration and, in particular, ichthyological illustrations.

Robert W. Little (1976, p. 91) claims, "To my knowledge, the most informative work on the Oriental practice of *Gyotaku* (perhaps the only one in English) is Dr. Yoshio Hiyama's book *Gyotaku: The Art and Technique of the Japanese Fish Print."* This is a commonly held opinion today, voiced by many *gyotaku* and 'nature printing' practitioners, even though Dr. Hiyama's book was published in 1964. In fact many *gyotaku* practitioners think of Hiyama as their teacher and others began using *gyotaku* because they found a copy of Hiyama's book. One such person is Joe McAuliffe who has practised *gyotaku* since 1992, and declares on his website that:

> "The English translation of the book *Gyotaku: The Art and Technique of Fish Print* by Yoshio Hiyama served as my most important and valued source of information on techniques and methods. The guidance provided by this book was absolutely essential for my artistic development and I consider Yoshio Hiyama to be my *gyotaku Sensei*, or teacher" (McAuliffe, n.d.).

The Mexican artist Marcelo Balzaretti (1971-2013) also testifies to the importance of Hiyama's publication and explains: "while working on a series of prints from three-dimensional inked matrixes such a reproductions of a sheep's head, a skull or my own face and body, I found the book *Gyotaku:* The Japanese Art of Fish Printing by

Yoshio Hiyama and after reading the first pages decided to start working on it." (*apud* Anderson, 2006, p.2). Balzaretti created a range of *gyotaku* impressions which were made into nine animated film loops and displayed on light-boxes.

A number of English publications are in existence which feature *gyotaku* either as illustrations or as *gyotaku* images accompanied by information about the printing process and/or history. These range from examples of individual practitioners work and groups such as *Gyotaku-no-kai* (Association of *Gyotaku*) and the Nature Printing Society (NPS), to subjects such as fishing, cooking, scientific and natural history studies, the catalogues and on-line publications of various art exhibitions, lesson plans and educational events which feature *gyotaku* to more general studies relating to the history and practise of 'nature printing'. However, the fact remains that there has not been a comprehensive study of *gyotaku* since Hiyama's publication in 1964. I aim to redress this issue by investigating the concept of *gyotaku* and how it has developed from a single colour 'trophy print' of a fisherman's catch to the diverse and colourful art form as it exists today. This is achieved primarily by placing it in a historical context in relation to the visual arts, particularly printmaking and science in terms of natural history illustration, and in relation to the materials and techniques used to create *gyotaku*.

Printmaking and prints are central to our understanding of the past and the present as well as for our future. Many scholarly studies exist regarding the centrality of printmaking to human culture and perhaps one of the most influential of these is by the American historian Professor Emeritus Elizabeth Lewisohn Eisenstein (b.1923) whose epic work was first published in 1979 (two volumes) entitled *The Printing Press as an Agent of Change: Communication and Transformations in Early Modern Europe*

(Eisenstein, 1979). Alcorn Baron, Lindquist & Shelvin (2007, p.12) commented on the book:

> "Whether viewed as a visionary or limited since the early days of its publication, *PPAC* has dominated and divided conversations about print and its effects. Given our present concerns about the fate of the book and reading in this age of electronic technological revolution it is clear that the role of print in the historic development of scientific, intellectual, and cultural movements remains central."

Despite several explanations about the limitations of the Chinese moveable type and Chinese and Japanese woodblock printing Eisenstein's and other scholarly studies generally examine prints made with a printing press and do not include 'rubbings' in their discourse. *Gyotaku* is not included in these studies and yet it plays a key role in the Japanese culture of fishing and the decline of the military role of the *Samurai* in Japan.

However, Georges Didi-Huberman, like Eisenstein, acknowledges the importance of printmaking to human culture and yet he asks us to reconsider the importance of the actual materials and techniques used in its production and the heuristic value of the print This is clearly evident in his publication *La Ressemblance par Contact: Archéologie, Anachronisme et Modernité de L'empreinte* in which Didi-Huberman proposes that we reconsider the current situation of printmaking and in order to understand our encounters with "impressions" we need to be both historians and anthropologists. He intends to amend the ways in which we understand works of art in their historicity, which he claims is too dependent upon a deductive model that assumes a movement of "progress" from modernism to postmodernism and that "evolution" in art is possible. In a rough translation from the French he states:

> "We should be willing to put ourselves in front of a sculpture by Donatello, Rodin or Marcel Duchamp, as before a print made by a historic hand. With such an impression, in fact, we do not know in advance, we must criticise everything we already know from a still closer examination of the material itself" (Didi-Huberman, 2008, p. 12).

Gyotaku has gradually become accepted in the field of contemporary printmaking and is often chosen as a means with which to illustrate ichthyological studies and yet there is a paucity of information concerning *gyotaku* and it is a process which raises limited discourse in the field of contemporary printmaking. However, this is gradually starting to change as the versatile qualities of this printing process are becoming recognised and more artists are choosing to use this technique or to develop their own variations of *gyotaku* for creating their art works.

I aim to establish the origins of *gyotaku* by analysing the existing literature and exploring the interdependence which exists between the printmaking methods /techniques, and the materials and tools such as paper, ink, brushes and tampo's with their geographic origins. The connection between artists' materials and techniques and the direct contact and feel of these materials when they are used in specific techniques is examined in the two volumes of Joseph Meder's publication *The Mastery of Drawing* first published in German in 1919. This was later translated into English and revised by Winslow Ames in 1978. Meder suggests the term: "Graphic – (from the Greek *graphikos)* to write, draw or incise is the inclusive adjective of drawing, printmaking and writing in the handwritten sense" (Meder, 1978, p. 313). I also suggest a socio-cultural connection with the materials and techniques used in *gyotaku* and the traditional visual arts of Japan.

Another art form that is taken into consideration which in many ways aligns itself with the practise of martial arts and *kata* is the art of Japanese fly fishing called *tenkara*, as practised by *Samurai* and modern day enthusiasts. Although it is often assumed that the earliest prints were made to record the catch from a successful fishing trip the connection with *tenkara* has not been previously explored. With regards to

fishing I also explore contemporary *gyotaku* practitioners fishing philosophies such as 'catch and release' and eating what they have caught after printing or freezing specimens to use again. In 2003 Victoria Braithwaite[1] and a team of researchers demonstrated that fish feel pain. Further research revealed that fish have cognitive abilities which were previously only seen in animals which are accorded protection in most countries such as; chimpanzees, dolphins, hawks and lions (Braithwaite, 2010). Braithwaite's work caused a great deal of discussion and feedback from people who either thought that she was persecuting fishermen, because they felt fish do not feel pain, or others who thought that it was obvious that fish do feel pain, so why bother to perform this research? Furthermore, the question of 'pain in fish' is one which many *gyotaku* practitioners (who print fish and other aquatic life forms) have already developed their own ethical philosophies about before the results of Professor Braithwaite's research was published. Some people question the idea that *gyotaku* practitioners are concerned with nature conservation and environmental issues because they use a dead fish with which to make a print. Therefore, I have examined a selection of artists work which include fishes or other aquatic creatures either as live or dead specimens and various attitudes towards their works. The more general area of 'animal studies' research has not been dealt with in-depth in this study but some theories relating to human encounters with fish have been addressed.

The definition of the word *gyotaku* remains unresolved in current literature, it is generally translated as 'fish print' or 'fish rubbing'. I aim to clarify the meaning and use

1 Victoria Braithwaite is Professor of Fisheries and Biology at Penn State University, USA and Visiting Professor of Biology at the University of Bergen in Norway. In 2006 she was awarded the fisheries Society of the British Isles Medal in recognition of her work and contribution to fish biology.

of the word *gyotaku* by tracing its history and development, including early examples of the diversity of subject matter. Also, included is a selection of contemporary practitioners whose work is technically pushing the boundaries of the *gyotaku* printing process and aesthetically embracing the process as a 'safer method of printmaking' and as an art form in its own right. I aim to give an outline of the ways in which *gyotaku* is used today, by whom and the particular reasons why this process is chosen as opposed to other printmaking processes. *Gyotaku* practitioners are a diverse group of people who have proved to be difficult to categorise because their work, interests and *gyotaku* practises relate to a variety of disciplines such as visual art and graphic design, natural history illustration, the art of fishing, nature conservation, education and even cooking (the fact that many of them enjoy cooking and eating their edible specimens at the end of a printing session). By exploring a selection of *gyotaku* practitioners I aim to demonstrate the ways in which this process has a value to a range of disciplines and crosses the boundaries of certain disciplines, either as simple 'trophy prints' or as a fully developed art form.

In order to investigate these issues, the study examines some *gyotaku* prints first hand including: a collection of Boshu Nagase's *gyotaku* at the Fishing Museum in Concarneau, France; in the USA the works of various members of the Nature Printing Society who attended the 2010 Annual Workshop held at the Oregon Institute of Marine Biology in Coos Bay, Oregon, a range of Japanese 'trophy prints' and *gyotaku* works by Japanese artists in the collection of Dr. F. G. (Eric) Hochberg, Santa Barbara, California, the works of Genny and Shane Anderson and their marine natural history collection, Santa Barbara, California, the works of the late artist Jerry Lee Ciblic (1957-2011) Malibu, California; in the UK the natural history illustrations of the Reeves

Collection held at the Natural History Museum, London, a range of illustrations and art works from the collection of the Wellcome Trust, London, preserved and live aquatic specimens, photographic images and diving equipment from the collection of the British Antarctic Survey in Cambridge, natural history illustrations, Japanese woodblock prints and Chinese Stone and bronze rubbings from the Fitzwilliam Museum, Cambridge and the British Museum, London. A wide range of *gyotaku* works were also viewed on-line. Articles, books, pamphlets, DVD's, CD's, television programmes, exhibition catalogues and records of organisations such as the Nature Printing Society and the American Museum of Natural History are also important sources of information. I personally contacted many of the people discussed in this study in order to gain first hand opinions and information about their own particular practice and information about *gyotaku*, fishing and wildlife and environmental conservation in general.

Utilising these sources, this thesis addresses the issues mentioned in eight chapters, the ninth chapter is the conclusion of this study. Chapter two takes an overview of the Japanese word *gyotaku* and defines this by placing it in the context of the tradition of European 'Nature Printing'. By drawing on the three recognised *gyotaku* printing processes their origins are explored. This is followed by an examination of the spread of *gyotaku* from Japan to America and the rest of the world. A selection of contemporary applications of *gyotaku* are discussed including ceramics, interior design and household objects, scientific publications, wine labels and artists works.

Chapter three examines the methods, mediums and history of natural history illustrations of fishes and other aquatic creatures. Although *gyotaku* is a process suitable for printing a wide variety of subjects the theme of aquatic life forms resounds throughout this study because the earliest *gyotaku* extant are of fish. It also considers the

problems with locating specimens, viewing them in their natural habitat, the change of colour and how to render the colour accurately and the changes which occur with preserved specimens. The effect of technology is examined such as the early forms of photography and the introduction of printing processes i.e. lithography and how this was used in natural history illustration. It is also argued that Japan had its own tradition of natural history illustration which because it was not printed, as in the European tradition its dissemination was limited and yet it was highly skilled and accurate with the majority of specimens being easily recognised by today's scientists and naturalists.

Chapter four looks at how *gyotaku* has developed from early 'trophy prints' to a recognised art form. By examining *gyotaku* and other printing process in conjunction with works which are produced with the concept of a 'homage to nature' *gyotaku* is placed in the context of a 'safer practice' or 'eco-friendly' printmaking. The significance and use of traditional colours in Japanese arts is explored as is the use of these colours in *gyotaku*. Also, the perspective, compositions and subject matter found in *gyotaku* impressions is examined.

Chapter five considers the *gyotaku* work produced by a range of practitioners who are loosely categorised under the headings; artists and variations of *gyotaku*, *gyotaku* masters and practitioners, illustrators and graphic designers, teachers, scientists and naturalists and fishermen. The works featured concentrate once again on aquatic creatures although many of the practitioner use *gyotaku* to print a range of subject matter. This is in order that an ever present theme is recognised in the works that present different styles, techniques, materials and reasons for making such images.

Chapter six probes the history of papermaking. Taking *washi*, Japanese hand-made paper, as its central theme this chapter analyses the most important plants and

additives used in its production and the traditional production methods and tools. It clarifies what *washi* is and why it is a vital substrate for use in the creation and development of *gyotaku*. The Japanese papermaking process is contrasted with the European tradition, materials and tools. This chapter ends with an appraisal of contemporary *washi*.

Chapter seven and eight scrutinise the inks, tools and techniques used in *gyotaku* printing. The definition of an ink is clarified and an overview is given of its history and the traditional production of *sumi* ink, which was used in the earliest *gyotaku* impressions and is still used today by some practitioners. It introduces the basic formula of modern oil based inks and justifies the standard testing and labelling of modern inks in different countries. The tools such as brushes and their history are investigated as well as the silicone replica life-forms, various *gyotaku* kits or patents for special chemical treated *gyotaku* papers.

It is hoped that this research contributes to a greater understanding of *gyotaku*, a versatile, safer and accessible printmaking process and adds to the existing knowledge concerning its origins, history, development and current practise which are worthy of dissemination.

2. *Gyotaku*: Fish and Aquatic Life-Forms as Print Matrix

2.1. Introduction

The first issue addressed in this chapter is to define *gyotaku* by outlining three recognised *gyotaku* printing processes and by placing them in the context of 'Nature Printing' and the European tradition in order to understand *gyotaku*'s' unique qualities. The second issue deals with the origins of *gyotaku* and builds on existing knowledge and hypotheses concerning *gyotaku*'s origins and history from the 1800's to today, noting the important developments and applications of the techniques. Furthermore, I explore some of the cultural symbolism and social conditions in which *gyotaku* impressions were produced. Specifically those connected to Japanese fishing and freshwater fly fishing, *Tenkara*[2] as distinct from its European counterpart. I suggest a connection between *gyotaku* as a *kata*[3] and the arts practised by Japanese nobles and *Samurai*.

The remainder of the chapter investigates the spread of *gyotaku* from Japan to the rest of the World. I examine the dissemination of ideas and skills tracing *gyotaku*'s journey in America. Firstly, I explore the link of *gyotaku* with science through the natural science illustrations of Janet Roemhild Canning at the Smithsonian Institute. Secondly, I consider *gyotaku*'s links with art and artists and highlight the gradual modifications of the Japanese traditional aesthetic. Finally, I investigate the Nature Printing Society and its

2 *Tenkara* is a Japanese word which literally translated means 'from heaven' or 'from the skies'. It is a traditional type of fly fishing in which a bamboo rod is used without a reel.

3 *Kata* is a Japanese word which means 'form' and is associated with the traditional Japanese arts. "The establishment and formalisation of the pattern or form (kata)." (Davies & Ikeno, 2002)

role in education and the promotion of *gyotaku* globally. The chapter concludes with an overview of contemporary *gyotaku* including; alternative forms of fishing trophies and verification of the prize catch used in Japanese fishing tournaments, artistic *gyotaku* and mixed media, natural science illustrations, educational uses, decorative and design applications such as apps for iPhones, ceramics, surf boards, clothing, household items, and wine labels. This chapter enables the reader to gain insight into; what *gyotaku* is and why it is different from other forms of 'nature printing', the theories regarding the techniques origins, the spread of *gyotaku* from Japan to the rest of the world, how *gyotaku* crosses the boundaries of art, science and sports fishing. *Gyotaku* is placed in a contemporary context indicating the significant events and people involved in *gyotaku*'s progression. The publication in 1964 of one of the most influential books in English, about *gyotaku*, was by Yoshio Hiyama[4] Since then there have been several printed publications concerning 'how to make' *gyotaku*, catalogues of exhibitions and books dealing with the wider topic of nature printing, monographs of *gyotaku* practitioners work, and publications in which *gyotaku* illustrate the works of marine biologists and instructional fishing techniques. Also, an increasing number of articles, videos and discussions about *gyotaku* are available on the Internet. However, an in depth study bringing together the many facets of *gyotaku* has not been published in English and this thesis will provide up to date information, and present alternative theories about a subject which has, at times, been marginalised and overlooked.

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4 Yoshio Hiyama's book was published under two slightly different titles. One book is titled *Gyotaku: Fish Print* with the 1964 copyright held by the University of Tokyo Press. This book was printed in Japan and does not bear a Library of Congress Catalogue Card Number. Another version exists with the title *Gyotaku: the Art and Technique of the Japanese Fish Print.*It was published in 1964 by the University of Washington Press and states that this is the American edition. The Library of Congress Catalogue card number is 64-8398.

2.2. What is *Gyotaku*?

In simple terms *gyotaku* is a Japanese word used to describe specific printing techniques whose original intent was to create impressions from fish using the genuine fish as the print matrix (plate). *Gyotaku* techniques do not require a printing press at any stage of the process.

Some confusion surrounds not only the word *gyotaku*, but also its meaning. For clarification it is necessary to examine the two Japanese 'Kanji' characters, '*gyo*' and '*taku*. (Figure 1). Literally translated '*gyo*' means 'fish' and is formed from the pictograph of a body of the fish, with fins and tail fused with a man bending over to catch the fish. '*Taku*' means 'rubbing' or 'impression' and is related to the Chinese word '*t'a*', the common form for 'rub' or 'rubbing'. Phonetically, *gyotaku* is pronounced *ghee-oh-tah-koo*. Sometimes, English expressions are used such as 'fish print', 'fish rubbing', 'fish impression' or occasionally, 'Ichthyography'.

Figure 1 - Kanji of *gyotaku*, gyo = fish, taku = rubbing or impression

The word '*gyotaku*' was promoted in the 1950's by the group *Gyotaku-no-kai* (Fish-Print Friends or Association of *Gyotaku*) (Hiyama, 1964a, p.9). Prior to this several

expressions were used and the group aimed to unify and clarify the different techniques by deciding upon the "proper" word. Yoshio Hiyama declares that:

> "In the past, before the word *Gyotaku* became widely used, besides *Gyotaku*, the terms Gyo-shu or Uo-zuri were also used with the same meaning as *Gyotaku*. "Shu" or "suri" (Zuri is the same as Suri) means "to print" or "to rub" (Hiyama, 1964a, p.3).

Another similar expression is *Gyo-kei* or *Uo-gata*, which means "impression" or "form or shape" of fish. The meaning of the Japanese word *gyotaku* has changed with the passage of time. Originally, it referred to printing techniques in which the print matrix was a genuine fish. Subsequently other aquatic specimens were encompassed such as, cephalopods, crustaceans, mollusc, seaweeds, rocks and pebbles. Because *gyotaku* techniques can be applied to create impressions of a variety of flora, fauna and inanimate objects the word *gyotaku* is also sometimes used as a general term, referring to the printing techniques rather than the subject matter which is printed. For example, today, it is possible to use the same printing techniques to make impressions from silicone life-like replicas of fish, the prints made from these are still referred to as *gyotaku*. The artist and one of the founder members of the Nature Printing Society, Robert W. Little comments on the use of the word *gyotaku:*

> "As I understand it, the Japanese name for fish printing, *Gyotaku*, means "fish impression" or "fish rubbing". I think the word is misused in the United States. A fish print may be called a nature print, but I do not think that a print of a maple leaf should be called *Gyotaku*" (Little, 1985, p. 91).

Currently, several *gyotaku* practitioners may disagree with Little's comment, making use of the word to refer to the printing methods rather than the subject matter. A case in point is Mineo Ryukyu Yamamoto[5], who claimed:

5 Lecture presented at the Beaty Biodiversity Museum, British Columbia, Canada in 2011, https://www.youtube.com/watch?v=D1bhNI7hssM Retrieved June 12, 2013

"The *gyotaku* is good record of the shape of flower or fish or any animals, and now I am promoting *gyotaku* should become common word such as sushi, tempura, sukiyaki or karaoke or manga. Someday, I wish you can understand and see *gyotaku* word even the print is flower or any animal not only the fish. I am trying in myself, but still I have some objection if I say printing flower hard to say fish printing" (Yamamoto, 2012).

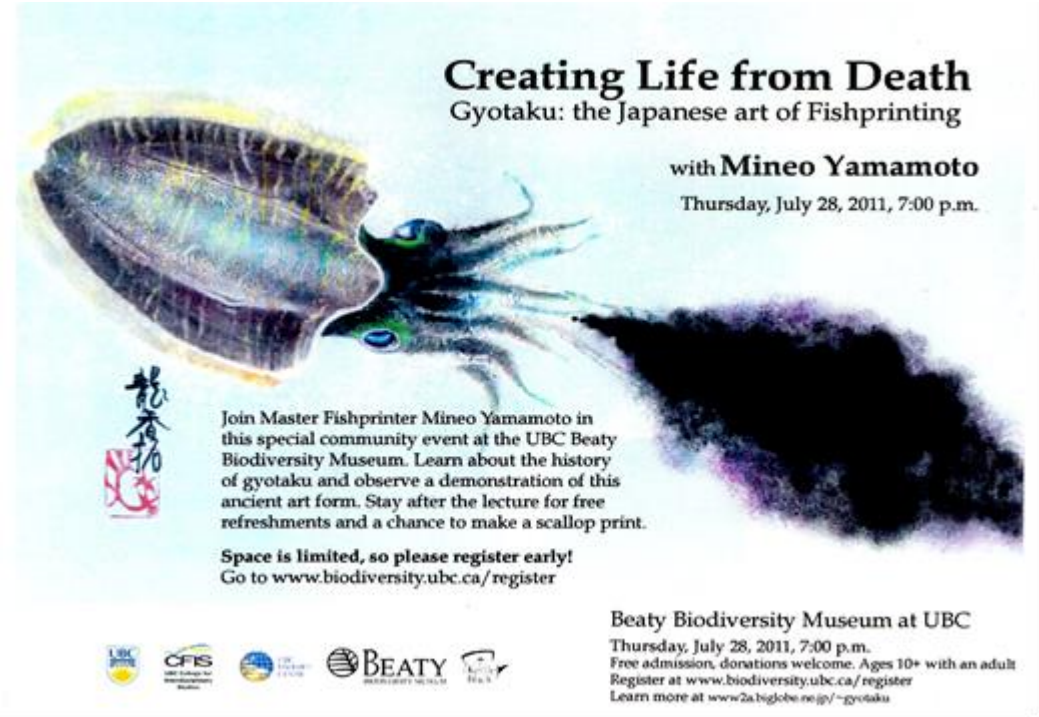

Figure 2 - Mineo Yamamoto's flyer for the lecture and demonstration at the Beaty Biodiversity Museum. Image courtesy of the Beaty Biodiversity Museum, University of British Columbia.

In the present thesis the word *gyotaku* is used to encompass three specific printing techniques for making faithful copies of aquatic life forms, botanical specimens, other natural specimens, and man-made objects. I recognise that all three techniques can be used to create impressions of natural or man-made items other than fish or aquatic life forms as suggested by Yamamoto, but when items such as sand or dried leaves are glued onto these aquatic *gyotaku* I refer to these as 'mixed media *gyotaku'*. Similarly, I understand Little's statement about *gyotaku*, but recognise that *gyotaku* techniques have been used over a period of time and the subject matter available for printing has

diversified. Therefore, I believe this diversity should be taken into account and the definition of *gyotaku* should not be connected to what is printed but the process of how it is printed. The names for other printing techniques such as 'screen printing', 'etching' and 'lithography' do not describe the images or objects which are printed, merely the technique or process of production. It should be noted that this categorisation is purely a personal preference. Some of the uses and the different meaning of the word *gyotaku* have been briefly described but it is also important to place the technique in context with nature printing techniques to enable the reader to understand the unique qualities of *gyotaku* and why it is different from other forms of printing. Occasionally, *gyotaku* impressions are classified as 'nature prints' due to the fact that the image is made from either natural or preserved specimens or from life-like silicone rubber replicas which have been cast from genuine specimens. However, the term 'nature prints' is a more general term and generally refers to a tradition of printmaking, in which a diverse range of techniques, including photographic processes, and subject matter can be employed. Examples of subject matter for nature prints' with a variety of different techniques include flora, fauna, minerals, insects, (lepidochromy from pigments in butterfly & moth wings) mammals, reptiles and amphibians, discarded skins (snakes), animal and human skeletons (Cave, 2010). Therefore, *gyotaku* can be categorised as a sub-division of nature printing because the subject matter itself is from nature, however, such a definition does not take into account the uniqueness and differences of the techniques, materials, aesthetics and the fact that man-made subject matter can also be used.

Nature printing has a rich history and some of the earliest images classified as nature prints were made approximately twenty thousand years ago:

"In the cave paintings in many parts of Europe, North Africa and elsewhere, as well as

> pictures of animals, scenes of hunting and so on, hands form a very common image. Sometimes these hands are scratched or painted, in the same way that the images of animals were produced, but sometimes one sees hands which have been outlined by pigment, in a method much like stencilling. These nature prints from the Peche-Merle caves near Cahors, France (or wherever else ones sees them) have a haunting effect. The people who made these prints seem more real, more individual, because we can see these hands. We have no idea why they made these pictures, whether they had magical or religious significance, but considering how most later nature prints use plant forms, it is interesting to note that cave paintings seldom, if ever, include plants" (Cave, 2010, p.14).

In fact, closer analysis of the image of hands in ancient cave paintings suggest they were made from genuine human hands as they have variations such as missing fingers and deformities. Apart from these very early examples, the majority of early nature prints were made from botanical specimens. There is no evidence of fish or other life forms being printed. Simple botanical prints were produced by coating a sheet of paper with oil, this was then held in the smoke rising from a candle or oil lamp until it became completely blackened. A leaf or other botanical specimen was laid on top and a piece clean paper placed on top of this. An impression was made by burnishing the specimen through the paper with a smooth surfaced tool. The oil and soot transferred to the surface of the leaf. The leaf was then placed between two sheets of clean paper, burnished once again and the result was a transfer print. One of the difficulties encountered in producing early botanical prints was the leaking of the plant fluids onto the paper (Armstrong & De Zegher, 2004). This could be remedied if the plants were pressed beforehand but it was still only possible to create a few prints per specimen using this method. Leonardo da Vinci and his friend Luca Pacioli both wrote detailed accounts of how to make nature prints from leaves. These are found in Pacioli's book *De Viribus Quantitatis* thought to have originally been written in 1498 (Cave, 2010). Perhaps better known is da Vinci's print of a sage leaf and his instruction about how to make nature prints written around 1508 in his folio *Codice Atlantico* (Brooks & Harris, 1989). During the 1500's an interest in the use of medicinal plants in Italy lead to an increase in the

production of nature prints to illustrate medical manuscripts. The knowledge of these techniques gradually spread from Italy across Western Europe:

> "For all its virtues, nature printing had a major weakness. A plant or leaf would not hold up indefinitely, and after several inkings and stampings it would fall apart from use. So "editions" such as Kniphof's were severely limited. Clearly and alternative to the direct-print method was needed, one that could transfer the the plant's impression to a printing plate." (DiNoto & Winter, 1999, p.95)

Hieronymous Kniphof, professor and librarian of the botanical society of Erfurt city, produced botanical prints (direct-method) in partnership with the bookseller and publisher J.M. Funcken in about 1728 called *Botanica in Originali se herbarium Vivum* (DiNito & Winter, 1999). Over the next three hundred years alternatives to the direct-print method were developed. Both the amateur and professional involvement and interest in nature printing played a significant role in these developments. A range of new printing processes, printing materials and advances in technology lead to a wider range of subjects being printed. Techniques developed included the electrotyping method, stencilling techniques, lithography techniques on stones and plate, etched methods including soft-ground, and Taylor's lace printing method, a range of photography and photography based methods for example cyanotypes, gum dichromate prints and sun prints (Cave, 2010).

An important factor which distinguishes *gyotaku* prints from other nature printing processes is the probable origin of the technique in the Far East, independent of the European printing industry and 'Western' technological developments and culture. In fact the influence of the European print industry only came after the Japanese seclusion from the west and the Tokugawa (1615-1868 CE) system ended and with the implementation and rise of the Meiji era (1868-1912 CE) when Japan shifted swiftly from a semi-colonised status to the position of a colonial power (Gordon, 2003). Furthermore, *gyotaku*

prints were originally produced using specific materials found only in the Far East such as oriental papers and inks, (explained in detail in chapters six and seven). Nonetheless, *gyotaku* techniques share some technical aspects also used for other nature printing techniques. This can be seen in the simplest process of making botanical prints; a leaf is covered in ink and paper is pressed onto it, which in many aspects is similar to the direct *gyotaku* technique. However, the use of different materials, composition and aesthetics in *gyotaku* all lead to an 'oriental style'. More importantly, *gyotaku* prints are always made by the artist himself without the use of other artists or craftsman to interpret the artist's original work or to prepare it for printing in another medium, which can be the case with some nature printing techniques.

Figure 3 - Photo of fishing tackle shop window in Kobe, Japan, 2004. Photo by the author.

Many people's first encounter with direct *gyotaku* are the prints displayed in fishing tackle shops in Japan (Figure 3) or hands on experience using this technique in schools in America or by participating in art workshops or classes. The direct technique is

generally the preferred choice of fishermen for creating 'trophy' prints of their prize catch. It can be a relatively quick and easy technique and can be performed outdoors with minimal materials, in a boat or beside the river or seashore. None of the *gyotaku* techniques require a printing press. A brief introduction to the main *gyotaku* techniques are now outlined and are described in detail and illustrated in chapter eight.

2.2.1. Direct *Gyotaku*

In Japanese direct *gyotaku* this is called *Chokusetsu-ho*. The first stage with all three techniques is the cleaning and preparation of a specimen. Once this has been done it is laid out as flat as possible with the help of supports under the tail and fins. A single colour or several coloured inks can be applied with soft brushes or dabbed onto the surface of the specimen with 'dabber's', 'dauber's' or 'tampo's'. It is important to ensure there are no visible brush strokes and the application of ink is thin and even. Once sufficiently inked up a sheet of paper (preferably Japanese or one with long fibres and a good wet strength) is placed on top. Then gentle pressure is applied from the fingertips onto the paper in order to print the specimen. The impression will be a mirror image and if it is made from a fish the eye is painted in by hand once the print is completely dry (McAllister, 1986).

2.2.2. Indirect *Gyotaku*

In Japanese indirect *gyotaku* this is called *Kansetsu-ho* Once the specimen has been prepared a vital stage in this technique is the application of the paper (or cloth). If this can be successfully mastered it makes a great deal of difference to the quality of the finished print. This stage cannot be performed hastily as there may be the possibility of

air bubbles, folds or wrinkles forming in the paper or cloth which will impair the printing process and the finished print. Once the paper or cloth has been applied successfully, and is fully dry, printing can commence. Ink is applied with dabber's or tampo's onto the paper or cloth and the colours and any markings on the specimen are made up gradually in layers. Each coloured ink is applied with a separate tampo. When the printing is complete the paper or cloth is carefully removed and left to dry. The final stage is painting in the eye. This technique results in a right reading image which has a softer appearance than the graphic impressions produced using the direct technique (Karstad, 1987).

2.2.3. Transfer *Gyotaku*

> "A third method is called the Tensha-ho introduced by Mr. HIDENOSUKE TANAKA. The Tensha-ho method may be translated as the "Transpainting Method" in English" (Hiyama, 1964a, p.12)

This technique is used for transferring oil based paint or ink from a specimen onto a variety of substrates such as leather, wood, metal or glass or for printing onto objects such as handbags. The specimen is cleaned and prepared as usual. Special attention is paid to ensuring that the specimen is thoroughly dry before the next stage. Oil paint or ink is applied directly onto its surface in a slightly thicker layer than is necessary in the direct method. A sheet of polythene is placed on top and printed by applying gentle pressure with ones fingertips. The polythene is then placed on top of another substrate or object and transferred using the pressure from the palm of one's hand. This method echoes 'off-set' printing techniques.

2.3. The Origins and Early History of *Gyotaku*

Although nature printing, (human hands), can be traced back to twenty thousand years ago and the methods used for reproduction have a complex and interwoven history, the origins of *gyotaku* remain obscure. There are two main hypothesis regarding *gyotaku*'s origins. The first one recognises China's influence upon Japan and reasons that *gyotaku* probably developed from the ancient Chinese art of stone rubbing. In contrast to this the alternative hypothesis speculates that *gyotaku* originated in Japan independently, and may or may not have been influenced by Chinese rubbing techniques or the Japanese rubbing techniques called *takuhon* (Fukuoka, 2012). Due to the lack of documentation it is difficult to determine exactly when, how and why *gyotaku* developed, or if indeed the oldest known *gyotaku* extant, represents the oldest example of a relatively new art form. Earlier examples may be discovered in Japan, Korea or China, yet at the time of writing the present thesis the oldest *gyotaku* extant example is of a carp of the Mogami River created in 1857 and housed in the Honma Museum in the Yamagata prefecture, Japan. (Japan's oldest fish print, c.a. 2010). The uncertainties surrounding *gyotaku* can perhaps be better understood by examining the significance of fish in Chinese and Japanese culture, in order to understand some of the reasons that people wish to create and own images of fish.

Ancient pictograms were the basis for the written Chinese language and evolved over the centuries in Japan to form Kanji (Dykstra, 1987). Sometimes these are so far removed from their origins that they resemble completely unrelated characters. An example of this is the Chinese character for fish, *yú* that was initially represented as a simple head, tail and fins and now several hundred years later resembles a combination of

the Chinese characters for 'field' and 'fire' and is interpreted as a fish swimming in a field of water, its skin flashing like fire in the sunlight (Yibin, 2009). It is not only the appearance of the written characters but also the pronunciation which has influenced the meaning, for example:

> "The Chinese word for 'fish' (yú) is phonetically identical with the word meaning 'abundance, affluence' (yú): so the fish symbolises wealth. A picture of a child with a fish means 'May you have an abundance of high-ranking sons'" (Eberhard, 1986, p.106).

It is interesting to note the association of status with wealth also described by Basil M. Alexeive in his lecture delivered at the School of Oriental Studies at the University of London on the 28th March, 1926:

> "The idea of wealth in both ancient and modern China is peculiar in that it is frequently combined with the desire for high official rank. The oppressed people, seeing how rapidly and inevitably the holding of an official position was followed by the acquisition of a fortune, regarded the two as inseparable. Hence the combination fu kuei wealth and rank – an expression of very ancient origin" (Alexeiev, 1928, p.7).

Fish not only represent wealth and, by association, rank but are also emblems of regeneration due to their reproductive powers. They are symbols for harmony and are thought to bring good-luck because they are seen to be happy in their element. The iconic image of the leaping carp embodies the idea of endurance, courage and accomplishment and is a metaphor for success in passing the imperial examinations as this leads to employment as a government official, ensuring a life of prestige and wealth (Figure 4). Chinese legend proclaims that carp swam upstream in the Yellow River annually to spawn. Those that were able to leap up and over the waterfall at Dragon's Gate were transformed into dragons (Yingying, 2014). The notion that dragon's were once fish has been linked to the large size of their scales. Today, the popular phrase 'Lǐyú (carp) jumps over the Dragon's Gate' is still in use. Chinese and Western *gyotaku* practitioners enjoy creating impressions of carp as not only are they a symbol of courage, endurance and

accomplishment but their scale pattern means they are a particularly suitable fish for printing with either the direct, indirect or transfer methods. The symbol of the fish is closely related to union and fertility:

> "a brace of fish is presented amongst other articles as a betrothal gift to the family of the bride-elect on account of its auspicious significance, as fish are reputed to swim in pairs, so a pair of fish is emblematic of the joys of union, especially of a sexual nature; it is also one of the charms to avert evil, and is included among the auspicious signs on the FOOTPRINTS OF BUDDHA" (Williams, 1974, p.185)

It is stated that a person who achieves the 'true Buddha state of emancipation' will know of no restraints or obstructions and is therefore similar to a fish which is able to swim in any direction. The three main schools of thought in China, Confucianism, Daoism (Taoism) and Buddhism greatly influenced every aspect of ancient Chinese and Japanese culture and so the symbolism of the fish prevails today in modern culture (Makeham, et al., 2008).

Figure 4 - *Gyotaku* by Joseph R. McAuliffe 'Carp Leaping Over the Dragon's Gate'. Image courtesy of Joseph McAuliffe

Buddhism came to Japan from Korea and China during the sixth century CE. *Shintō*, already existed in Japan with its central belief in animistic gods called *kami*, perceived in all aspects of nature while others are sacred to human activities such as art and agriculture (Harris, 2001). The symbolic meaning associated with fish may account for the desire to create and own images of them thus enhancing harmony, abundance and wealth and avoiding evil. Images of fish are much appreciated in China and Japan and are frequently depicted as decorative motifs in architecture and on objects such as porcelain, textiles, ink paintings, lacquer ware, and live fish are kept in ponds and aquariums.

In order to create an acceptable *gyotaku* the fish or other specimen used as the print matrix must be dead. Although Buddhism advocates the avoidance of killing

animals such prohibitions were not evenly accepted or zealously applied when used for food. This exception explains why the prohibition was frequently reinforced in different periods; for example, during the Meiji period the official prohibition regarding meat consumption was lifted (Richie, 1992). Fish which were printed as *gyotaku* were usually eaten after printing and one of the ways to avoid any spiritual ills was through a ceremony which ritually cleansed and avoided evil from the act of killing animals in order to eat them. This ritual cleansing could easily be applied to fish which may have been printed before being eaten. One such cleansing ritual can be found in the elaborate knife ceremony as used by chefs:

> "The spiritual dimension of dismembering a bird or fish seems hard to imagine, given that, in pre modern Japan, Buddhism provided ample arguments against taking life and Shintō warned of the contamination from contact with blood and death. Nevertheless chefs interpreted the knife ceremony as a powerful way to cleanse any spiritual ill effects of taking animal life for food, not only from themselves and their patrons, who included high-ranking aristocrats and samurai, but also from the fish or bird that found itself on the cutting table" (Rath, 2010, p.39).

Today, in both China and Japan fish are eaten at New Year, in the hope of bringing good luck and prosperity in the coming year. Both countries consume vast quantities of fish and have an ancient fishing culture and cuisine. The legendary Chinese Emperor Fu Hsi (2953-2838 BCE) was said to have been given his name which means "Hidden Victim" because he made different kinds of nets and taught his people how to hunt and fish. Margo Demello explains the connection between hunter gatherer cultures and some of their beliefs as follows:

> "Wild animals such as bears or wolves tend to be worshipped in hunter-gatherer cultures. For example the Ainu, the indigenous people of Japan, believe that a spirit called kamuy runs through all living beings, but that bears have more than other creatures, and that when gods appear to human kind, they do so in the guise of bears. Generally, those hunting cultures that depend on one animal above all else tend to ritually honour that animal, and may hold festivals in their honour, as do Alaskan tribes for the whale. Fishing cultures too, may have gods that reside in fish, as with the Japanese deity of Ebisu-gami that took on the guise of either fisherman or a shark, and was revered among fishing people" (Demello,

2013, p.313).

It is possible that the Anui's *kamuy* could have been integrated into later *Shintō* beliefs and become known as *kami*, in a similar manner that Buddhism did not displace the native faith of *Shintō*. Instead the two religions were made to complement each other and Japan adopted aspects that it needed or admired grafting the foreign elements onto its own existing order. Temples and shrines occasionally merged into one 'sacred space' and served the different needs in the lives of the people. In modern day Japan household gods and shrines to Ebisu, one of the seven gods of Japan and the patron of fishermen, became popular in the Muromachi period (1392-1573CE). Today, there are over one hundred *Ebisu* or seven lucky god shrines in Japan as a whole. *Ebisu* ensures a good catch for fishermen and a safe journey for all seafarers since he himself arrived in Japan from the sea. He is always depicted with a beard and pointed cap carrying a large fish either a red sea bream or a sea bass dangling from a fishing rod in his right hand or carried under his left arm (Fujino & Skinner, 1997). Some of the earliest examples of *gyotaku* in Japan are of red sea bream. Is this merely a coincidence or does it have some specific relevance? Or perhaps the frequency of prints of red sea bream is related to its abundance and the frequency with which it was caught. No doubt the fish would have been eaten so perhaps less tasty fish or inedible specimens were released and did not become *gyotaku*.

Despite Ebisu's popularity it is the god of water - Suijin-sama who protects the neighbourhood of *Nihonbashi* and the infamous Tsukiji fish market in Tokyo:

> "Tsukiji's Suijin-sama holds title to a domain that is discontinuous geographically and to an increasing extent socially. The tiny Sujin shrine at Tsukiji is a branch of a slightly larger shrine to Suijin-sama located in the precincts of the Kanada Myōjin shrine, several kilometres to the north-west" (Bestor, 2004, p.93).

This is one of Tokyo's largest *Shintō* shrines and is where the old fish market stood until 1923.

Clearly, an outline of the symbolism relating to fish, fishing and water has been explored and evidently certain aspects are still prevalent in modern day Japanese culture. However, it is necessary to review *gyotaku*'s relationship with fishing as this undoubtedly influenced the techniques and provides support for the hypothesis that *gyotaku*'s origins lie in Japan. Editors of a 1972 publication "*Gyotaku* An Art of Fish Print" claim:

> "the oldest known *gyotaku* was done in 1855 in Yamagata prefecture, Japan, by a knight, Mr. Yokomori, who was in the service of Duke Sakai. I believe it is entirely possible, however, that still older ones may yet be found. It is clear, however, that this is among the youngest of Japanese art forms" (Hiyama et al., 1972, p.3).

An alternative and earlier explanation about the history and origins of *gyotaku* by Hiyama (1964a, p.7) states the artist was unknown:

> "A few years after the publication of the first edition of a book on *Gyotaku*, in Japanese, by members of our Association, a newspaper reported the finding of the oldest *Gyotaku* in Japan - and perhaps in the world up to the present moment. These pieces of *Gyotaku* were found in the private museum of Mr. Homma, a millionaire landlord of Sakata City, Yamagata Prefecture- a local area of Japan. It is now known that a century ago, LORD SAKAI of that district made a big catch in just one night, and to preserve this catch in memory of his triumph, fish prints of the catch were made. Beautiful, *Gyotaku* of Red Sea Bream, many of them were large, were probably made on LORD SAKAI'S order, by some unidentified artist. Two of the prints, one made by the 'direct method' and the other by the "indirect method" of *Gyotaku* was of recent origin, it was indeed a great surprise to see these beautiful pieces, made by the "indirect method", among several other fish prints dressed on scrolls."

Mr. Yokomori described as a knight may have been a lower ranking *Samurai* whose Lord Sakai was the *Daimyo,* the provincial Lord, and both of these men may have been skilled in the art of fishing and perhaps both in *gyotaku*, a natural extension and keepsake of fishing trips. Kevin Kelleher MD and Misako Ishimura (2011, p.1) describe the roots of *tenkara* or *tengara* with relation to *Samurai:*

> "During Japan's 260-year Edo period (1603-1868), the Tokugawa shogun ensured the region's security and peace through an iron rule. With this peace came leisure, especially for the samurai. These warriors, a significant portion of the populace, were encouraged to fish. Some say this was to temper their warlike nature, others say it was to keep them fit and trained in stealth, agility and quick reactions- the samurai who were the dominant class, made fishing fashionable and commissioned rods from bamboo crafters."

Because *Samurai* were encouraged to practise the arts such as calligraphy, poetry and fly fishing, it is conceivable that *gyotaku* was included as a natural extension of fly fishing. The modern martial art of *Kendo* has its origins in the training of swordsmen and *Samurai*. The practice of a set pattern of movements called *kata* is a highly beneficial system for training and maintaining the direct links to the origins of classical swordsmanship. These movements are performed so that they can be performed automatically, without thinking, leaving the mind empty and clear from distraction (Turnbull, 1986). Despite the fact that today *kata* is associated with the practice of martial arts some Japanese artists create works of art in a similar manner and follow a variation of a *kata* or a 'ritual for working' in which they empty their minds almost as if in a meditative state and perform *gyotaku* techniques in a set pattern, similar to performing a *kata.*

Towards the end of the Edo or Tokugawa period, Japan witnessed the beginnings of westernisation and an increasing interest in all things Japanese by the foreign government officials working there. The first reference to *tenkara* fly-fishing in English was made in 1878 by Ernest Mason Satow in one of his diaries called 'Diary of Climbing Mt. Tateyama' (Allen, 2014). Satow worked under Sir Harry Parkes who is known to have encouraged his staff to research and document certain aspects of Japanese life (Ota, 1998). Another early account of Japanese fly fishing came from George Elliot-Gregory to the Asiatic Society on March 28, 1877 in which he describes in some detail the *ke-bari* fly fishing rod as being fashioned from simple bamboo and the line is used without a float or sinker and a simple artificial fly (Kelleher & Ishimura, 2011). In fact *tenkara* was not only practised by *Samurai* and nobles but was a form of fishing used by subsistence fishermen and professionals living in the interior of Japan. The forested and rocky

geography with streams and rivers meant farming was more difficult in these areas and therefore a particular style of fly fishing developed that depended on local materials and efficiency. The abundance of bamboo, there are over forty six different genera and well over six hundred species, meant that the Japanese rods were made from bamboo. These were manufactured in sections, facilitating easy transport and storage and there was no need for a reel which was developed in European fly fishing due to the fact that the rods were manufactured from heavy wood and the reel helped to extend the reach.

It is conceivable that professional fishermen and *Samurai* may have made images of fish to record the abundant supply of fish and to bring them good luck. Although the majority of the *gyotaku* housed in the Honma Museum are of saltwater fish there are several references in Japanese to *gyotaku* of the freshwater crucian carp of the Tinsel Moat, that may have been printed in 1839 (Shimizu, 1971). Indeed Hiyama (1964a, p.7) reports:

> "There are many persons in Japan who believe they had independently originated the technique of *Gyotaku*. The late Mr. SEIJN MURAKAMI perhaps first had conceived the idea of *Gyotaku* when he noticed that the fish he caught had left an impression on a white paper bag after receiving a coating of some dye from the candy that was also in the bag. Another person, Mr. SHIRO SHINOZAKI was very fond of collecting rubbings of stone monuments, and for this purpose he developed his own technique; which we now call the "indirect method".

Admittedly, the history of the indirect *gyotaku* technique can be traced to Mr. Shiro Shinozaki, Dorothy Goodwin reports that:

> "A magazine, Tsuribito (Fisherman) is sponsored by three *gyotaku* artists, and the "Story of *Gyotaku*" was told in its July, 1955 issue. In that article *gyotaku* artist Isshu Nagata reveals that he learned the method from the archaeologist, Shiro Shinozaki. He remembers that the archaeologist also showed him an old book entitled Rubbing Books and *Gyotaku*." (Goodwin, 1956, p.440)

Isshu Nagata, a member of the group *Gyotaku-no-kai,* later went on to write about *gyotaku* in Japanese and was one of the editors of '*Gyotaku* An Art of Fish Print',

published in 1972, the chief editor being Professor Emeritus Yoshio Hiyama. Shinozaki also taught Mr. Funaji Endo and Kouyou Inada, perhaps one of the artist with whom Western *gyotaku* practitioners are more familiar with due to the recent publication *Antarctic Fishes: illustrated in the gyyotaku method by Boshu Nagase.* In this publication Professors Mitsuo Fukuchi and Harvey J. Marchant explain:

> "*Gyotaku* Master Kouyou Inada (1897-1974) is credited with the development of the polychromatic indirect method in the late 1940s and 1950s. He began by using silk to cover the fish, and later moved to the use of fine paper. Nagase-san studied under Master Inada for five years. One of the principal living exponents of the polychromatic indirect method, he is himself credited as Master" (Marchant & Fukuchi, 2006, p.18).

Although evidence exists regarding the history of the indirect and polychromatic indirect *gyotaku* techniques the history and origins of the direct technique remains elusive.

2.4. From Japan to America

Speculation and uncertainty still surrounds the origins of *gyotaku* despite the links found with Chinese stone rubbing and fishing activities and multiple dates are proposed for the oldest extant *gyotaku*. 1839 is the date suggested on the Japanese website 'Fishing year history Shonai'[6]. Dr. Hiyama and the editors of the 1972 publication '*Gyotaku* An Art of Fish Print' claim the oldest *gyotaku* dates from1855, and 1862 is the date suggested by Hiyama (1962a). In fact, an even earlier date is proposed by Michael L. Frankel (1990, p.302):

> "Here's something you can do between the time you catch a fish and prepare it for the evening meal. It's called *GYOTAKU* (pronounced ghio-ta-'koo). *Gyotaku* is a Japanese fish printing art which has been around since the 17th Century recording catches of sport fish. It is believed to have been practised by Samurai warriors who were required to be skilled in fishing, the fine arts, as well as martial arts."

6 Fishing year history Shonai. Retrieved June 12, 2014 from www.homepage.2.nifty/com/hekisuiturishi/saikono*gyotaku*.html

Evidently it is not only the origins, and the date credited to the earliest fish print extant, but also the type of fish which were printed which are also in question. Peter B. Moyle (1993, p.247) claims that: "Fish printing or *gyotaku* is an art form developed by the Japanese initially as a means of recording large or unusual fish caught before the days of refrigeration and taxidermy." It is logical that fish prints made by fishermen needed to be created quickly and were probably made outdoors. However, the early *gyotaku* housed in the Honma Museum exist in both the direct and indirect techniques and are impressions of Red Sea Bream, *Pagrus major* whose maximum length can reach 100 cm. The fish printed are generally much smaller and this species is not an unusual catch in Japan. Records show that it has been considered an auspicious fish, associated with traditional Japanese New Year foods *Osechi-ryōri* since the Heian period (Kazuko, 2001). Similarly, the Japanese white crucian carp, *Carassius cuvieri,* a freshwater species that was part of the staple diet and has a maximum length of only 35 cm was also printed. So the earliest fish prints appear to be made from fish which were commonly caught and eaten by a large part of the Japanese populace and were not unusual species.

In April 1955 the group *Gyotaku-no-kai (*Association of *gyotaku* artists, sometimes called friends of fish print) was formed at the University of Tokyo (Hiyama, 1962a). Yoshio Hiyama, was one of the founders of the group and Koyo (or Kouyou, which is an alternative spelling). Inada, Isshu Nagata, Hideo Sato and Yokoku Shimizu were all founding members (Hiyama, et al., 1972). This group played an extremely important role in defining exactly what *gyotaku* means as the subject matter had already expanded to include plants, flowers, insects and numerous inanimate objects. They also helped to spread the knowledge of *gyotaku* to countries other than Japan, particularly to the USA, and helped to create an interest in this printing technique elevating it from a

simple means of recording fish captured in fishing to a recognised art form (Hiyama, 1955). *Gyotaku-no-kai's* first exhibition was held in the Matsuya Gallery in Ginza, Tokyo, Japan. Members of the group were responsible for organising work to be sent to the USA for an exhibition held at the American Museum of Natural History, New York, from June 21 until September 4, 1956 entitled: *Gyotaku the impression of a fish* (Knox, 1956). This exhibition helped raise awareness about *gyotaku* amongst the public and was helped by the fact that Janet Roemhild Canning the natural history illustrator and artist, gave demonstrations of the technique in the museum so visitors could gain a further insight into how these images were produced (Hiyama, 1964a). At this stage, the history of the two main *gyotaku* techniques remains impenetrable, despite efforts to document *gyotaku*'s history in Japan.

When natural history illustrators and scientists began to use *gyotaku* techniques in the 1950's they considered the indirect technique in black and white gave the most suitable impression for scientific illustration (Auberjonois, 1954). This idea has changed over time and today black and white, colour, direct and indirect prints are considered suitable for natural history illustrations and artistic works. Undoubtedly, Shiro Shinozaki greatly influenced the indirect technique, but clearly the prints at the Honma Museum demonstrate that the technique was not new but already used during the mid 1800's.

After the Second World War *gyotaku* started to receive international publicity and Isshu Nagata (1903-1988) the well known photographer was a *Gyotaku-no-kai* artists who contributed to its spread from Japan to the USA. Articles featuring his work, with a step-by-step guide about how to make *gyotaku* appeared in several major US publications. Will Burtin (1908-1972), a pioneer in graphic design and information design was responsible for publishing examples of Nagata's and Inada's *gyotaku* work in the Summer

1954 issue of Scope magazine. Burtin worked as the Art Director for Scope magazine for twenty two years and first encountered black and white *gyotaku* images in January, 1956 in a copy of 'New Japan' magazine, Burtin wrote to the company 'English Manichi' care of the Japanese Consul General in New York and after several months he received a package containing several *gyotaku* images (Remington & Fripp, 2007). However, it is not known if the author of the *gyotaku* article, Fernand AuberJonois (1910 - 2004), a highly respected journalist, was familiar with *gyotaku* or if he was commissioned to write about it (AuberJonois, 1954). The Scope magazine, was produced on a quarterly basis, as an Upjohn Pharmaceutical Company magazine for distribution to Doctors and other professionals in the medical field across the USA. Burtin was awarded the Art Directors Club gold medal for the1954 summer issue of the Scope magazine featuring *gyotaku* (Art Directors Club, 1954). In 1960 Nagata's monograph *'Gyotaku'* (Nagata, 1960) was published in Japanese and featured a selection of freshwater and saltwater fishes as Nagata-san was an avid angler. He later went on to become one of the editors (with fellow members of the *Gyotaku-no-kai* group) of a large format book published with Japanese and English text called '*Gyotaku:* An Art of Fish Print', published in 1972 (Hiyama, et al., 1972), the chief editor was Professor Emeritus, Yoshio Hiyama.

Shiro Shinozaki is also thought to have taught Mr. Funaji Endo whose print of five seahorses published in the 1972 book demonstrates that Japanese *gyotaku* artists continued to experiment with different materials and push the limits of the techniques. Although no further details are listed about the dimensions or the substrate used for the print, the seahorse or seahorses were probably dried specimens. The print is listed as an indirect *gyotaku*. The substrate appears to be a white decorative paper with random sized

holes and to which six maple leaves were added when the paper was made. Funaji Endo's signature seal can be seen in red ink in the lower left hand corner (Hiyama, et al., 1972).

Another student of Shinozaki was Kouyou Inada, a professional gold engraver, keen fisherman, and member of the group *Gyotaku-no-kai*. Inada was one of the editors and contributors to the 1972 publication. He is perhaps one of the artists with whom non-Japanese *gyotaku* practitioners are more familiar due to a recent publication, '*Antarctic Fishes*' (Fukuchi & Marchant, 2006), illustrated in the *gyotaku* technique by his student Boshu Nagase (Figure 5):

> "*Gyotaku* Master Kouyou Inada (1897-1974), is credited with the development of the polychromatic indirect method in the late 1940s and 1950s. He began by using silk to cover the fish, and later moved to the use of fine paper. Nagase-san studied under Master Inada for five years and as one of the principal living exponents of the polychromatic indirect method, he is himself credited as Master" (Fukuchi & Marchant, 2006, p.18).

Figure 5 - Boshu Nagase, indirect polychromatic *gyotaku*, *Portunus convexus*, 40 x 32 cm. Courtesy of Oceanographic Museum Monaco©.

Despite the paucity of evidence, in English, regarding early *gyotaku* and its origins the third technique, the transfer technique is considered to be relatively new. Hiyama

(1964a, p.13) offers further support for this notion and also describes a further development:

> "Mr. HIDEO SATO introduced another method and he calls his method the "Quick Method." In this method, a thin sheet of paper is first stuck on the surface of the fish body. Ink or watercolour is then applied all over the paper sticking to the fish body, either by brush or tampo. Finally, just as in the direct method, the sheet of paper that is to receive the impression is laid over the first paper already on the fish. The outer surface of the second paper is now rubbed so that the impression may be received on the inner surface. In this method it must be observed that if the first paper is not thin enough the impression will be obscure."

The transfer technique is not widely used outside of Japan probably because *gyotaku* practitioners are more familiar with the direct and indirect methods.

Yoshio Hiyama (1909 –1988) one of the founders of *Gyotaku-no-kai*, is often credited with bringing *gyotaku* to the USA and did indeed introduce various professionals in the USA working in a scientific capacity to the techniques of *gyotaku*. As a graduate from the Department of Fisheries, Faculty of Agriculture, of the Imperial University of Tokyo in 1934, Hiyama was familiar with *gyotaku* produced by fishermen across Japan and recognised in *gyotaku* the potential for creating both natural history illustration and artistic images. His scientific research covered a wide spectrum and he contributed greatly to the progress of science and international collaboration:

> "He began his research with fish taxonomy. He contributed to various important projects, such as the classification of Triglid fishes around Japan, descriptions of new species (Chloropthalmus acutifrons, Bathyraja tobitukai, etc.), and venomous fish in the South Seas. In the latter study he examined precisely the names, taxonomic positions, morphology, toxic organs, and toxicity of specimens etc. For this study he received an award from the Association of Japanese Agricultural Scientific Societies in 1945" (Shimizu, 1988, p.1).

Hiyama was also a pioneer in fish ecology and worked on studies of the effects of radiation fall out.

> "His broad views, profound knowledge and fairness in making decisions were greatly appreciated in many governmental committees concerning education, welfare, fisheries, atomic energy and environmental problems" (Shimizu, 1988, p.2).

Gyotaku provided Hiyama with a means of further scientific study and a technique for illustrating scientific research. Furthermore, he fostered an appreciation and interest in the technique amongst the public and non-scientific communities which helped to elevate *gyotaku* into a recognised art form.

However, there is also evidence that people who were not connected to science or the *Gyotaku-no-kai* group also played a role in spreading *gyotaku* in America. One such person was Chiura Obata (1885-1975). Obata was born in Okayama prefecture, Japan, and his father was an artist. Obata was an apprentice to the painter Tanryo Murata, when in Japan, and trained in western and Japanese art. His first name is Zoroku and Chiura is his artist name which refers to the beauty of the 'thousand bays' on the Japanese coast near Sendai. He came to the USA in 1903 and continued to study art and worked in various jobs (Ross, 2000). In 1921 he became a co-founder of the East West Arts Society in San Francisco. After the death of his father in 1928, Obata returned to Japan for a short period where he supervised the production of thirty five coloured woodblock prints as part of his 'World Landscape Series'. These were printed in editions of one hundred by the Takamizawa Print Works in Japan (Stephens, 1993). When he returned to the USA he had several exhibitions of his work in California, which were very well received. Shortly after his return to the USA, Obata was appointed from 1932 until his retirement as professor emeritus in 1953 as an instructor in the Art Department at the University of California, Berkeley. He had a successful career as an artist, illustrator and educator and produced over three thousand illustrations and numerous front cover pages for the '*Japan*' magazine published for the Toyo Kisen Kaisha Steamship Company. His career was interrupted during the Second World War when as one of the more than one hundred thousand Japanese Americans, he was forcefully relocated to an internment camp. He spent over a

year at the camp from 1942-1943 where he managed to teach art and produce numerous works depicting day to day life in the camp. Over two hundred of Obata's paintings and sketches were researched and reproduced and edited in a book by his granddaughter Kimi Kodani Hill, entitled *Topaz Moon: Chiura Obata's Art of the Internment* (Kodani Hill 2000). Once the military exclusion ban was lifted in the USA Obata was reinstated at U.C. Berkeley. He is probably best known for his landscape paintings and prints of Yosemite National Park (Driesbach & Landauer, 1993). Although Goodwin (1956, p.441) reports:

> "In the United States, school children have always enjoyed making prints of leaves and flowers petals. It was in 1932 that fish prints were first introduced to the American public by a Japanese artist at the University of California. In that year Chiura Obata's print of a Steelhead was reproduced in the Oakland, California Tribune and since then Mr. Obata has taught many of his interested students and friends how to make *gyotaku*"

Goodwin's article is illustrated by various *gyotaku* including a direct print of a large Stripped Bass of thirty six pounds six ounces, caught in San Francisco Bay and printed on the 18th September 1949.

In America, it appears that interest in *gyotaku* grew in the early and mid-1950's after the Second World War. Hiyama (1955, p.210) explains "Recently this art of fish printing has caught the fancy of persons abroad and among them, Mrs. Janet Canning, a well-known American painter of fishes, has made some fish prints" (Figure 6). Sanka Knox's (1956, p.31) short article in the *New York Times*, about the exhibition of *gyotaku* at the America Museum of Natural History in 1956 reports that:

> "As Mrs. Canning showed, at the preview of an exhibition, *gyotaku* artists work with subjects "as dead as a mackerel", varying kinds of rice paper and infinite patience. When she took up the art in 1951 her instructions from Japan were so mysteriously worded that it took her three years to unravel them."

Francesca La Monte (1895-1982), fisheries scientist, author, editor and founding member of the International Game Fish Association (IGFA) was the Associate Curator of

Fishes at the American Museum of Natural History at that time, and comments in SCOPE magazine (AuberJonois, 1954, p9):

> "the task of American scientists would be greatly simplified, if they knew how to 'fingerprint' fish in this manner. We spend hours on the docks and piers taking tape measurements, counting scales, and filling notebooks with figures, whereas the fish print, accurate in every detail, is like a blueprint which we could study at our leisure. In other words, an ichthyologists dream come true. As yet only two people in America seem to have mastered this art."

Unfortunately, there is no mention of the name of this other person and at the time of publication it is known that people such as Chiura Obata were already making fish prints and teaching the techniques to his students. But it is plausible that the artists and scientists had little contact and therefore this article is referring to another scientist who mastered *gyotaku* techniques.

For clarification regarding names and the tradition of married women taking their husbands surnames it should be noted that Mr. John Canning sent a note to the Nature Printing Society which was published in their first newsletter in the Fall issue (Dewees, Hochberg, Geary, & Little 1977a, p. 4) that clarifies Janet, the natural history illustrator and artist's name:

> "From John Canning, Breahead, Rousay, Orkney, Scotland, UK – A note from John to this effect: "Where Janet's name occurs" on early works do not look for Janet Canning, She was better known as Janet Roemheld. All of Janet's important paintings and illustrating works were signed Roemheld."

Dorothy Goodwin reported in October 1956 that the interest in *gyotaku* continued to grow and supports this by stating (Goodwin, 1956, p.441):

> "But it is not only artists and ichthyologists who have become interested in *gyotaku*. Learning of the prints from an American soldier who had become acquainted with *gyotaku* in Japan, one American housewife who wanted an opportunity to create something artistic tried her hand at it. When she became an expert devotee of *gyotaku*, her husband an artist, had to make one too, and soon he was turning out fish prints as a hobby. His employer, the J. Walter Thompson advertising agency, was not slow to realize that it had something special in its own back yard. Last year Joseph Fekes's prints were exhibited in his company's offices throughout the country."

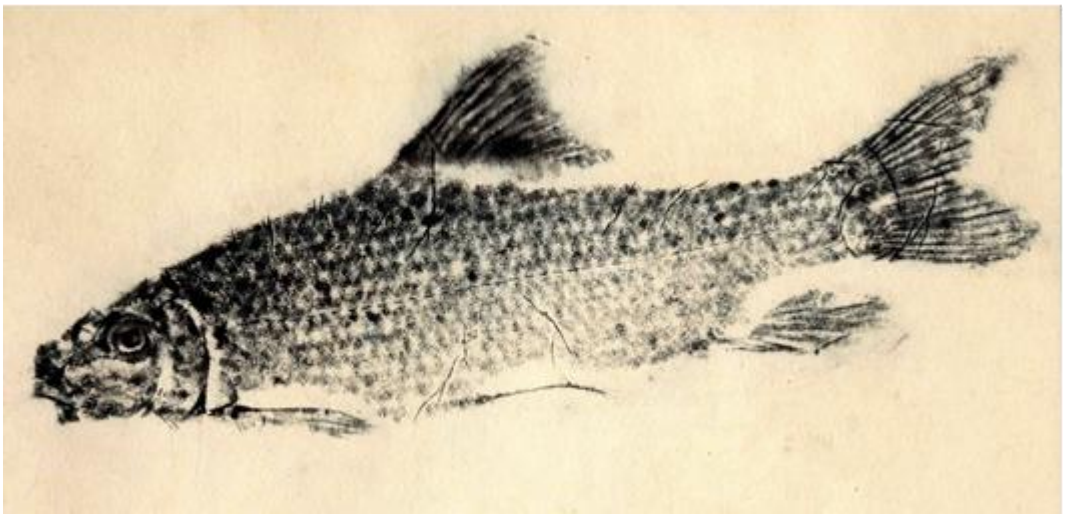

Figure 6 - Indirect *gyotaku* of a 'Sucker' by Janet (Roemheld) Canning, 1950's. Exhibited at 'Pressed on Paper: Fish Rubbings and Nature Prints' on tour in the USA from 1981-1985. Courtesy of Eric Hochberg.

A composite of Joseph Feke's *gyotaku*'s were featured on the front cover of the *American Artist* magazine in October 1955 (Feke, 1955, p. 8) and he wrote an article for the magazine about how to perform fish printing. There are reports that Yoshio Hiyama introduced the viewers to the art of *gyotaku* in an episode of the popular American television programme 'You asked for it', although records of this programme were unable to be located so this can not be confirmed. However, there is a document which records a radio talk in 1956 (Shimizu, 1956) presented in English, about *gyotaku*, its author another member of *Gyotaku-no-kai*, Yukoku Shimizu. Also, Roger L. Crossgrove, Professor Emeritus of Art at the University of Connecticut, worked at the Pratt Institute, Department of Graphic Design and Illustration in New York for approximately fifteen years, during which time he is known to have produced several direct *gyotaku*. As an instructor it is possible that he taught *gyotaku* techniques to students at the Pratt Institute (Parker, 1991).

Both Obata and Hiyama promoted goodwill and cultural understanding between the US and Japan and helped to further scientific and artist research through the medium of *gyotaku*. In fact, Obata received the 'Order of the Sacred Treasure Award' from Japan in 1965 in recognition of his work (Kodani Hill, 2000). Evidently, this was also helped by the members of *Gyotaku-no-kai*, who played a major role in the dissemination of *gyotaku* techniques, experimentation with variations on the techniques and different materials. The *Gyotaku-no-kai* group also helped to enrich the subject matter and produced prints not only of aquatic subjects but also plants and seaweeds, insects, dried and smoked fish, fish preserved in scientific collections in alcohol and formaldehyde, rocks and pebbles and ceramic vessels. The activity in Japan and America helped to raise *gyotaku* from a record or trophy of a prize catch into a widely appreciated art form. It also contributed to encouraging peace and understanding between nations at the end of the Second World War and an appreciation for nature. The sharing of information whether scientific or artistic helps to foster co-operation and collaboration and *gyotaku* is the perfect medium as it crosses the boundaries of both and includes the art or sport of fishing. It is not until the 1970's that another group, the Nature Printing Society, had sufficient influence to promote and actively spread and encourage the knowledge and practice of *gyotaku*.

2.5. The Nature Printing Society and International *Gyotaku*

Another group of enthusiasts who have helped to spread the practice of and information about *gyotaku* across the world is the Nature Printing Society (NPS). Christopher M. Dewees, Frederick G. Hochberg, Junior, known as Eric Hochberg and the late Robert W. Little are the founder members of the Nature Printing Society. It was established in 1976 as an international, non-profit, public benefit organisation. The

Society's purpose is both artistic and educational to advance nature printing. Current members, in 2013 are based in Australia, Canada, Germany, India, Japan, Mexico, New Zealand, Norway, Portugal, Sweden, Switzerland, the UK and the USA. As stated on the Nature Printing Society website at (www.natureprintingsociety.org) "Its purpose is dedicated to the education, the history, and practice of the art of nature printing, and to those who support our philosophy of respect for nature through the art of the print." Furthermore that, "Membership is open to all who share this vision" Guidelines for prints were established by the society and were based on those followed by the group *Gyotaku-no-kai* and are listed in the Society's first Newsletter. It is interesting to note point five under the heading of 'Guidelines for submission of prints:' that indicates:

> "Prints shall be pure and unretouched. Only in cases where the eye must be removed to accomplish a print (i.e. in vertebrates and in some invertebrates such as cephalopods and crustaceans) will it be permissible to paint in this structure later. No other structures (such as fins, spines, scales, teeth, etc. should be retouched)" (Dewees, Hochberg, Geary, & Little, 1977b)

This guideline echoes the ethos of many *gyotaku* practitioners today.

In order to advance nature printing in all its forms the society actively encourages publications of articles, demonstrations of nature printing, teaching classes and workshops, the creation of works for displays and exhibitions and curating exhibitions of nature prints. It also aims to encourage cooperation and the dissemination of ideas and knowledge and furthers the interest of its members by promoting acquaintance and cooperation amongst them. Since 1981 an annual NPS workshop has been held in order to promote such aims. The workshops usually last for approximately one week and have been held in venues across America, and in France, Germany and New Zealand.

Christopher M. Dewees one of the founder members has taught and participated as a student in many of the classes held at the annual NPS workshops. He produces *gyotaku*

from a wide range of aquatic creatures using both the direct and indirect methods (Figure 7). Christopher is a Marine Fisheries Specialist Emeritus of the University of California Davis. His main area of research is marine fisheries management. Tom Sharp, a fellow graduate student in fisheries biology at Humboldt State University introduced Dewees to *gyotaku* early in his career in 1968. Dewees recounts his early experiences on his website (Dewees, 2008):

> "Tom had seen a demonstration and we spent much of our free time exploring fish printing methods and materials with fellow fisheries students. This served as an excellent diversion from our studies as well as a way to earn a few dollars to pay the rent by selling prints at fish festivals and in shopping malls! I then continued to print fish in Chile during our two years of Peace Corps duty."

Figure 7 - Spot Shrimp, 2006, indirect *gyotaku* by Christopher M. Dewees. 35.5cm X 48.2cm, silk mounted on paper. Image courtesy of www.deweesnature.com

Now with over forty years' experience of *gyotaku* Dewees countless achievements in this field include the publication in 1984 of the book *The Printers Catch: An Artist's*

Guide to Pacific Coast Edible Marine Animals (Dewees, 1984b). It offers a wealth of information regarding the life history of species, fishery information with diagrams of popular commercial fishing methods and consumer information about edible fish, cephalopods, and crustaceans from the Pacific and a step by step *gyotaku* guide for direct and indirect printing. This book is illustrated with sixty three of Dewees *gyotaku* prints.

The detailed information provided, clearly represents Dewees scientific background and yet with regard to *gyotaku* he comments on the artistic expression of his prints:

> "A few times my works has taken on a solemnity I never expected. Once the owner of a pond full of valuable koi carp lost many of his fish because of a pump failure. He immediately called me and asked that I do prints of his prize fish. Another time an aquarium store owner called to request a print of his deceased longtime companion, a Brazilian arawana. Incidents like these point up the characteristic fascination of *gyotaku*. It is a technique that allows one to make an exact, literal record of objects and events while directing the viewer's perception of them through selection and composition. The image is accurate and "true" but can be shaped so as to reveal something new about its subject. It is this sort of communication that any artist seeks" (Dewees, 1984a, p.43).

Dewees has published assorted articles and illustrations about *gyotaku*, and taught numerous classes and workshops, his work has been exhibited in prestigious solo exhibitions of *gyotaku* and group exhibitions of *gyotaku* and nature printing across America, Japan and New Zealand. The majority of his prints are of aquatic specimens and can be found in private and public collections. Christopher comments on his website (Dewees, 2008):

> "My job as well as my passion for fishing brings me in contact with a lot of fish to print. Over the years I've developed contacts with other printers. In the mid-1970's Eric Hochberg, Jr., myself and a Pennsylvania botanist Robert Little put together the Nature Printing Society. We expected to attract 15 or so people with similar passion for nature printing. Little did we know that the Society would soon grow to over 300 members from around the world".

F. G. (Eric) Hochberg, Professor and Curator Emeritus of the Invertebrate Zoology Department of the Santa Barbara Museum of Natural History has had an equally

successful career, actively involved in research on a diversity of marine and terrestrial mammals. His main area of research is the taxonomy and biology of cephalopods and their parasites. He is one of the world authorities in this field and has had several species named after him by other scientists. Working with colleagues Hochberg has named and described thirty one new species. He co-founded and served as president of the Cephalopod International Advisory Council (CIAC) and in 2009 he was presented with a Lifetime Achievement Award for his work (Santa Barbara Museum of Natural History, 2012). Hochberg is one of the leading nature printers in the USA and has been active as a printmaker since 1968. His prints are represented in private, corporate, and museum collections in North America, Europe, Australia and Japan. Hochberg produces prints from a diversity of natural subjects which involves printing by hand and printing press and both the direct and indirect *gyotaku* techniques. However, unlike many *gyotaku* practitioners who favour one particular subject, Hochberg is equally skilled at botanical printing (Figure 8) and aquatic life forms. In Sukey Hughes article 'Eric Hochberg's Fish Heads and Other Rubbings from Nature' there is an explanation for this duality:

> "What I'm most interested in is the subject itself, and how to best express the form on a piece of paper." Hochberg's method combines calm, meticulous care and a kind of harnessed intensity, the same qualities he brings to his science. He is rare among printers in that he is accomplished at both plant and fish printing. "Eric has a special gift for both" says Virginia printer Marian Cromley who exhibited with Hochberg in a show at the Smithsonian Institute this year: "He's one of the best." In Hochberg's eleven years of nature printing he has recorded serpent stars and seashells, barracuda and bat ray, hatchet fish, shovelnose guitairfish, and one rare big scale pomfret found by two old ladies on the beach. He's captured the graceful, fleeting impression of male leaves and shepherd's purse, wild cucumber, sun-dew, filaree, and ground pine. In a breezy print of a plant called goat's beard, Hochberg's imagination and art take flight in the image of dried flower seeds plucked and scattered about the flower as if caught by the wind" (Hughes, 1981, p.74).

Hochberg belongs to several international and national organisations which are concerned with printmaking, natural science illustration and the dissemination of information regarding *gyotaku*, these have included; membership of the Japan based

society devoted to fish printing, *Gyotaku-no-kai*, from 1983 to 1988, the Wildlife Art Society of Australia from 1985 to 1988 and he is presently a member of the Guild of Natural Science Illustrators (GNSI), Santa Barbara Printmakers, the International Fish Print Studio, based in Higashimatsuyama, Japan (Personal communication, September 17, 2012).

In 1976 Hochberg became a lifetime member of the NPS. In 1985 Hochberg was the Museum of Victoria's Science and Humanities Scholar, which enabled him to create a *gyotaku* portfolio of Australian plants and fishes. This exhibition toured Australia during 1985 and 1986 accompanied by a publication about nature printing techniques written by Hochberg (Hochberg, 1985). As well as participating in prestigious one person and group exhibitions he has also curated innumerable exhibitions. In 2000 Hochberg curated the large exhibition 'Impressions of Nature' at the Santa Barbara Museum of Natural History. Hochberg has published numerous articles about nature printing, taught classes and workshops and presented public lectures. The archives of the NPS have remained at the Santa Barbara Museum of Natural Historyand Hochberg has been the archivist from 1976 to 2011. “It was this position, at the museum, that greatly influenced Eric's involvement in nature printing – by having a venue (the Santa Barbara Museum of Natural History) for classes, archives and exhibits” (Anderson, 2009). In 1975 before the founding of the NPS Hochberg was already teaching nature printing and taught a weekend fish printing class at the Santa Barbara Museum. Two of the participants were Genny and Shane Anderson, who remained friends with Hochberg over the years and yet had little involvement with nature printing. They returned to *gyotaku* in the late 1990's and often work together on large specimens. It is interesting to note that although Hochberg was already teaching

gyotaku classes in 1975 he continued to study and take part in classes taught by master printers and nature printers from Australia, Germany, Japan, North America, and Taiwan.

Hochberg declares that his biggest influences in nature printing have come from Robert Cale, an artist who studied at the Rhode Island School of Design, Southern Illinois University in Carbondale and at Atelier 17 with Stanley William Hayter and Krishna Reddy and the botanist and biology professor and botanical printer Robert W. Little (Hughes, 1981).

Figure 8 - Leaf prints made by Eric Hochberg featured in a handout 'Nature Printing: Leaves & Plants'. Image reproduced by the author with permission from Eric Hochberg.

The work of the late Robert W. Little can be found in both private collections and important botanical collections (Figure 9) such as those of the Hunt Institute for Botanical Documentation at the Carnegie Mellon University, Pittsburgh Pennsylvania. Little was a self-taught nature printer and states:

> "It was in the mid-1930's that my experiments began. They were stimulated by a single paragraph in a Boy Scout manual on how to make leaf impressions. I liked the results, and for many years in my spare time as a teaching biologist I continued to print plant specimens of diverse species. Eventually I began to experiment with different types of inks and a rich variety of Oriental papers. Training in the fine arts led me to pay attention to colour combinations, form and design, and my work took on more sophistication" (Little, 1976, p.7).

Little had a wide experience as a botany and biology teacher. He taught classes at various high schools, higher education institutions, art and craft institutions and natural history museums including: Haler High School, the University of Pittsburgh, Powedermill Nature Reserve of the Carnegie Museum, California University of Pennsylvania, and WQED the educational television channel. Robert was the first president of the Nature Printing Society, Dewees was the first Newsletter Editor and Hochberg the first Secretary and Treasurer. Clara Herron reports (Herron, 1988, p.15) "At least 30% of the nature printing society's members began as Little's students or have read his books."

In 1976 Little published *Nature Printing* and in 1985 *Creative Concepts in Nature Printing* (Little, 1985). Before this he collaborated on the 1970 book titled *As Oaks from Acorns Sprout* featuring Little's nature prints and haiku by Billie O. Hubrig, who at the time of publication was a professor of ElementaryEducation at the California State College, California, Pennsylvania (Hubrig & Little, 1970). Many of Little's students continue to practice nature printing and *gyotaku*. One such former student is Gudrun Garkisch who:

> "took her first class in nature printing with Robert Little in 1978 and has been printing ever

since. She has been a member of the Nature Printing Society since 1986 and has attended many of their annual meetings and workshops as a student and as an instructor. From nature printing by hand she has branched out to monotype, intaglio and nature printing on her etching press. She is a member of the Pittsburgh Print Group and has exhibited her prints in juried as well as invitational shows. During the summer months, following in the footsteps of Robert Little, she keeps up the tradition of teaching at Touchstone Center for Crafts in Farmington, Pennsylvania, where many a printer had been introduced to the art and technique of nature printing" (Larsen, 2011, p.9).

In June 2013 from the 24th until the 28th Gudrun was teaching nature printing at the Touchstone Centre for Crafts. To honour his name a Robert W. Little Scholarship was set up by the Touchstone Center and is open to any student enrolling at one of their adult level nature printing classes.

Figure 9 - Spanish moss and live oak featured on the front cover of the exhibition 'In Touch with Nature: The Art of Nature Printing in America'. Photo by the author.

Another honour for Little was the invitation to become a member of the group *Gyotaku-no-kai* and having his work included in their 1972 publication as one of only

three non-Japanese members. Little met Professor Yoshio Hiyama in 1956 at Janet Roemheld Canning's home in Maryland and it was the first time that he had heard the word *gyotaku* pronounced with a 'g' as in Goethe. He was also able to see aquatic specimens printed in the direct and indirect techniques (Little, 1976, p.7). As a member of *Gyotaku-no-kai* Little was invited to exhibit his prints in Tokyo, in 1972 and 1974 and visited Japan for the 1972 exhibition. The group had held at least one exhibition in Japan every year since its inception in 1955 and in 1956 the groups' first show outside of Japan was held at the American Museum of Natural History in New York City. This exhibition also toured to other cities in North America.

Another exhibition which had a major influence upon the public's awareness and appreciation of nature printing involved the three founder members of the Nature Printing Society. Eric Hochberg was the guest curator and Christopher Dewees and Robert W. Little (Figure 10) assisted Hochberg as jurors. The renowned exhibition 'Pressed on Paper: Fish Rubbings and Nature Prints' was jointly organised and sponsored by the Santa Barbara Museum of Natural History, the Nature Printing Society, the Smithsonian's National Museum of Natural History, and the Smithsonian Institution Travelling Exhibition Service (SITES) (Hochberg, 1981). The inaugural show was held at the National Museum of Natural History Smithsonian Institution, Washington, DC and the exhibition toured North America from April, 1981 until February, 1985. It then went to Australia where it was displayed from June, 1985 until October 1986: The show featured fifty five works from twenty six printmakers based in the USA and Canada. Undoubtedly, many visitors to the exhibition contacted the NPS and became members of the society while others realised that there were other people with similar interests and that they no longer had to work in isolation.

With the current advances in print based technologies, the revival of historical printing techniques and photographic techniques, and the manufacture and availability of new materials, printers are currently able to experiment with a wide reserve of techniques and materials enabling new subject matter to be printed. Therefore, nature printing itself is in a healthy state of flux, unlike some other print techniques in which very few advances are being made. Also, the greater awareness and desire to have a low impact on the planet and its resources puts *gyotaku* at the forefront of eco-friendly and non-toxic printmaking.

Figure 10 - Original logo designed by the founders, Christopher Dewees, Eric Hochberg and Robert W. Little. Courtesy of Nature Printing Society

2.6. Contemporary *Gyotaku*

Roderick Cave (Cave, 2010, p.168) professes:

"Those coming to nature printing today have many other possibilities open to them, which are quite different from those of previous generations. Special packs of sensitized paper for making cyanotypes are available from many craft suppliers. Sitting at my desk, with a

> packet of skeleton leaves from Thailand (which I have purchased in a craft shop in a small English country town) I can experiment with different combinations of these fresh or dried plants on my computer, I can print out a variety of attractive images and never even get my hands dirty. It is a new world."

It is not only the pre-coated cyanotype papers mentioned by Cave, but also digital printing technologies, digital photography and print on demand facilities which have been added to the contemporary nature printers 'tool box'. Today, *gyotaku* is used by a wide variety of people including artists, designers, educators, fishermen, illustrators and scientists, for diverse reasons from creating works of art to illustrations and decorative applications, fishing trophies, educational and research purposes. Their original impressions can be manipulated and reproduced with the help of these new materials and techniques. For example many *gyotaku* practitioners take a considerable amount of time to create the perfect print. They now have the opportunity to reproduce this print as limited, or unlimited, giclee prints on archival quality canvas and papers. They can also manipulate images on the computer and have these digitally printed. In 2006 Genny and Shane Anderson made their first digital prints on canvas from an original *gyotaku* print of a opah fish on white polyester fabric (Anderson, 2008). By taking the original *gyotaku* print and taping the fabric to a piece of foam core any visible wrinkles are eliminated and it is then possible to take a high resolution digital photo. The photo is then manipulated on the computer using Photoshop software. In this case the orientation was changed so the head of the fish is facing towards the right, this was then printed out at a local camera lab as a digital print using archival quality inks. The digital print is sprayed with an acrylic coating which protects it from environmental pollution and filters out a certain amount of ultraviolet light. The Anderson's issue a certificate of authenticity with each digital print signed by both of them and stamped with their signature seals.

Original *gyotaku* prints are used in various ways to create works of art. The artist Fred Fisher of 'Aquatic Impressions' is an avid fisherman and it was his interest in fishing that led to the desire to create visual memories of his catch using *gyotaku*. Unlike some other artists who create underwater scenes by printing seaweeds, or rocks and aquatic plants, Fisher uses mixed media techniques of *gyotaku* and collage. He applies genuine objects generally collected at the fishing location such as dried seaweeds, aquatic plants, sand, shells, and pebbles to the canvas or paper that supports a *gyotaku* printed fish (Fisher, n.d.).

Artists have also used *gyotaku* techniques to create limited edition handmade artists books such as *The House of Cod* published in 1996 by Picnic Press in Phoenix Arizona. Designed, printed and assembled by Linda Smith with text by Carol Schatt the pop up structure is designed to imitate a house of playing cards with a fishing trawler on top and netting covering the structure. It is comprised of relief line engravings and *gyotaku* fish, printed on a variety of Mexican, Philippine and Thai handmade papers in an edition of fifty. It is signed by the Author and printer (Smith & Schatt, 1986).

Recently, the Spanish artist and Director of the Paper Mill Museum Capellades, Victòria Rabal created a limited edition artists book to accompany her project and exhibition '*Gyotaku*: *capturar l'anima dels peixos'* (*Gyotaku*: capturing the spirit of fish). Several of her *gyotaku* fish impressions, which were printed on location at the Central Fish Market in Barcelona, were reproduced in a screen printed book (Figure 11). A limited edition of three hundred copies was printed by taller Vallirana, Barcelona in 2011 onto abaca handmade paper produced by the Paper Mill Museum of Capellades. The text was written by Jordi Lleonart, Fisheries Biologist and Scientific Researcher of the Institute of Marine Sciences (CSIC), Barcelona, Richard Schweid a North American

author and journalist and Joana Masó a Lecturer at the University of Barcelona, Researcher at the Center for Women and Literature and UNESCO Chair for 'Women Development and Culture' (Rabal, 2011).

Figure 11 – Victòria Rabal artists limited edition book '*Gyotaku*: *capturar l'anima dels peixos*', 2011. Photo courtesy of Lourdes Grobet.

Contemporary *gyotaku* artist can not only produce artists books using genuine *gyotaku* or *gyotaku* printed in another medium such as screen printing, used in Rabal's book, but can now create and publish their own standard format books of their work for use as exhibition catalogues and monographs, using a number of companies based on-line. New digital printing technologies have contributed in part to this and current concerns regarding environmental conservation combined with a desire to create multiples has led to 'print on demand' on-line companies. This technology has made short run and limited edition print runs commercially viable in a range of formats including; various dimensions, black and white or full colour, soft back, hard back, on a range of papers. The artist works on a computer to create the layout and finished printed project. When this has been proofed and finished by the artist on-line it is uploaded to the 'print on

demand' website and can be purchased by anyone with access to the internet. Once the customer's payment has been verified the product is literally 'printed on demand' and shipped anywhere in the world. A perfect example of this is the book *The Gyotaku Project* by Jeanette Jobson (Jobson, 2011) available from 'Blurb', in either soft cover, hard cover with a dust jacket, hard cover with an image wrap and also as an e-book , ibook, which can be downloaded onto an iPad.

Another person who has taken advantage of the availability of self-publishing is the Canadian professional *gyotaku* artist and avid angler, Mya DeRyan, known as 'The Fish Rubber'. Her book *Fish Tales and Stories* (DeRyan, n.d.) features images of her saltwater and freshwater *gyotaku* fish and a baby Green Sea Turtle which was produced as a special project sanctioned by and in support of the Caribbean Conservation Corp. Two hundred and fifty impressions were taken from a perished turtle hatchling and DeRyan believes this may be the first *gyotaku* of a Green Sea Turtle, as they are a protected species and she has not been able to locate any historical records of turtle rubbings.

Today, *gyotaku* practitioners are able to reproduce their original *gyotaku* works in other print mediums which offer quick and accurate solutions for reproduction onto a variety of substrates and objects. It is no longer necessary to spend an entire day printing a genuine *gyotaku* onto an item. Once the artist has created a suitable image it can be reproduced in a fraction of the time taken to create the original. At present two companies in England take advantage of various reproduction methods to print a range of interior décor and unique coastal products, which started life as original *gyotaku* impressions. Natalie Mason explains that the artist:

"Susie Ray at The Padstow Mussel Co. has grown up with a love of the seaside;

> beachcombing in Cornwall from a young age, taking inspiration from the many interesting treasures washed up daily from the Atlantic. As time has gone by Susie has made a living using her love of the Cornish coast and has now found a way for the local catch to leave a more lasting impression in her work" (Mason, n.d).

Ray started *gyotaku* experiments by printing prawns and shells using oil paints and an old cotton bed sheet. She then progressed to crabs which she found more challenging as the claws had to be printed separately and the pieces joined back together on the computer. After pleasing results Ray started printing fish from the local fishmonger called, 'Wings', which has a range of locally caught fish. Ray explains that all of the *gyotaku* images are scanned into her computer where she paints in the eye if necessary, and cleans up the area around the prints (Ray, n.d.). Once the image is perfected on the computer they can be printed out onto paper or canvas as limited edition prints or screen printed as in her range of one hundred percent cotton tea-towels. The Padstow Mussel Co. has a range of items in the Cornish Fish Rubbing Collection from tea-towels, to handmade greetings cards signed by the artist, digital reproductions printed on archival paper with pigment dye light fast inks and a new range of bone china mugs and tableware. Ray's seaside inspired work is well known in England and her *gyotaku* collection has been featured in the 2013 July issue of issue of 'Country Living' magazine (Hardage Barret, 2013).

Another enterprise, The Real Fish Rubbing Company was launched in 2010 at the Fossil and Art Fair in Lyme Regis, England. A collaboration between local artist Christine Allison and business owners Tony and Stephanie Colston they offer a range of *gyotaku* images reproduced as greetings cards, canvas mounted or unmounted on a wooden stretcher and signed by the artist, ceramic tableware and tiles. In recent collaborations with a company called 'The Reefer Sail Company' their *gyotaku* marine images have been printed on recycled sail cloth to produce wash bags, tote bags, cushions

and the quintessential furniture of the British seaside, deckchairs (Colston, 2010). Unlike the Padstow Mussel Co. they do not have their own shop but items can be purchased from stockist in Dorset, Devon and Cornwall including the shops and café of esteemed seafood chef, Rick Stein.

Handmade and hand printed ceramics feature prominently in the work of Hawaiian artist Reid Yoshida based in Honolulu. He graduated in Fine Arts, with specialisation in painting and ceramics, from the University of Colorado in Boulder, USA. Born and raised in Hawaii, Yoshida is an avid fisherman whose work is influenced by the oceans. He states in personal communication to the author on September 25, 2012:

> "My ceramic art ventures into new territory exploring a unique blend between painting and clay. My goal was to discover a way to combine ceramics and painting to create new and extremely original pieces. This goal materialized in February 2000, when both media of art meshed. Clay became my canvas for the printing and painting of prized Hawaiian reef fish. I began perfecting the ancient Japanese style of fish printing called *GYOTAKU*."

Figure 12 - Reid Yoshida hand-made and *gyotaku* ceramic printed tiles, Mahi-Mahi, 2008, 1270 mm X 965 mm. Photo courtesy of Reid Yoshida.

He has developed a method of pressing fish into wet clay with just the right amount of pressure to create an image which is fired and then painted with coloured glazes and fired again (Figure 12, Figure 13, Figure 14 and Figure 15). This creates works which capture both the texture and the colour of the fish and shellfish. His work sells to collectors around the world and has won awards at local and national exhibition, some of Yoshida's *gyotaku* works can be seen in Hawaii at the Nohea Gallery and at the Coral Creek Golf Course.

Figure 13 - Reid Yoshida, hand thrown ceramic with *gyotaku*, butterfly fish, 2010, 457 mm diameter. Photo courtesy of Reid Yoshida

Figure 14 - Reid Yoshida, hand thrown ceramic with *gyotaku*, Opae, 2010, 407 mm diameter. Photo courtesy of Reid Yoshida.

Figure 15 - Yoshida, hand thrown ceramic with *gyotaku*, Menpachi, 2010, 660mm diameter. Photo courtesy of Reid Yoshida.

Ceramics of a different nature were produced in a collaboration with the Florida artist and Captain of a deep-water fishing vessel, Gregory Aragon and Denis Spanek of Spanek Enterprises who create a range of ceramic tableware called 'L'Art Pour La Table' and the Portuguese ceramics specialist company A. Santos (Figure 16, Figure 17, Figure 18, Figure 19 and Figure 20). During the New Orleans Gourmet Product Show Aragon's *gyotaku* impressions were on display and viewed by Licinio Reis, the owner of A. Santos Ceramics, Portugal. Working with Spanek Enterprises they launched a range of limited edition ceramic platters made by the A. Santos company and decorated with lead free ceramic decals from Aragon's' original *gyotaku:*

> "The platters are offered as collectable limited edition pieces which once sold out will no longer be produced. All platters are dishwasher safe, freezer proof, and can go directly from the freezer to the oven to the table. Easily displayed on the wall, in private and commercial locations wherever fish are revered." (Spanek, 2012, n.p.)

Figure 16 - Black Grouper (*Mycteroperca bonaci*). Photo courtesy of Spanek Enterprises.

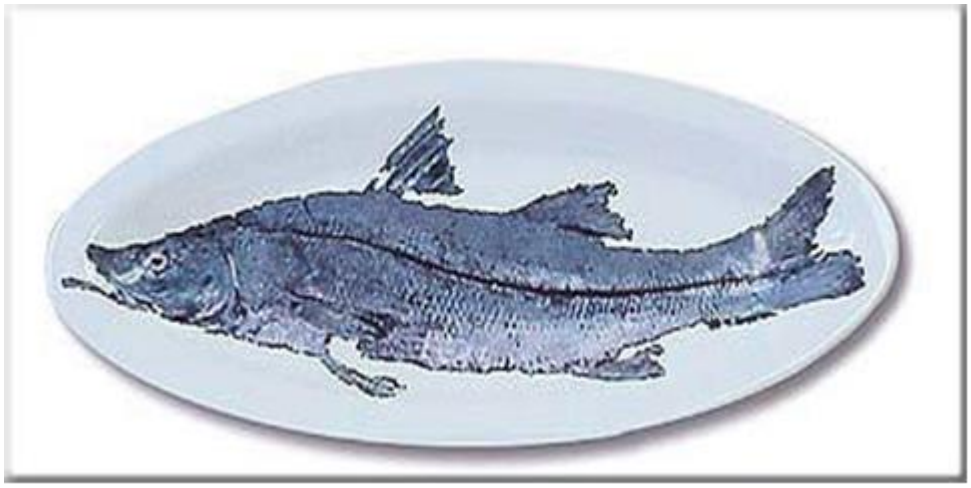

Figure 17 - Snook *(Centropomus undecimalis)*. Photo courtesy of Spanek Enterprises.

Figure 18 - Mutton Snapper (*Lutjamus analis*). Photo courtesy of Spanek Enterprises.

Figure 19 - Warsaw Grouper (*Epinephelus nigritus*). Photo courtesy of Spanek Enterprises.

Figure 20 - Scamp (*Mycteroperca phenax*). Photo courtesy of Spanek Enterprises.

A wine designed specifically to accompany *sushi* and *sashimi* was named '*Gyotaku*'. Domaine Mittnacht Freres is a wine producer in the Alsace region of France run by Christophe and Marc Mittnacht, who wanted to create a wine specifically for *sushi* and *sashimi*. In 2010 they produced the cuvée *Gyotaku* an organic, still, white wine. The label is designed with a fish print which resembles a direct *gyotaku* (Figure 21).

Figure 21 - Wine label with a *gyotaku* fish image for the Mittnacht Freres Estate, Alsace France. Image courtesy of Mittnacht Fréres website at www.nouvellesselections.com/winery.

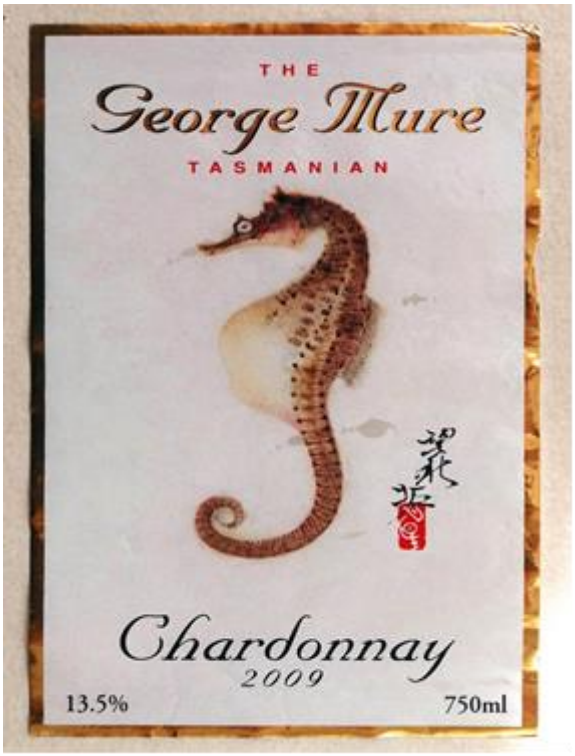

Figure 22 - Wine label with an indirect *gyotaku* seahorse by Boshu Nagase for George Mure, Tasmania. Photo courtesy of Yoichi Yabe.

Mures, an iconic Tasmanian family business that supplies sustainably caught and sourced seafood, produces a Chardonnay wine called the George Muir (Personal communication with Natalie of T. Wright, Fine Wine & Spirit Merchant on 19 January, 2012). This was first made in 2009 and the label has the image of a seahorse, which is reproduced from an original indirect *gyotaku* made by Boshu Nagase (Figure 22).

Vanity Fair magazine published a photographic project in 2012 called 'Food Porn'. Chefs, restaurateurs and food-world luminaries were asked to send them their culinary snapshots taken on their iPhone. Japanese chef Masaharu Morimoto who has 28 years experience in the food industry, an award-winning cookbook and recently opened his new restaurant 'Tribeca Canvas' in New York (Bereznack, 2012) participated in the project and amongst his photos of a wasabi root, ornate '*sushi* cake' and savoury Japanese pancakes was an image of a black *gyotaku* fish printed on a white serviette (Figure 23), its body formed from an arrangement of colourful vegetables and *sashimi*.

Professional *gyotaku* artist such as Naoki Hayashi record their prints using *gyotaku* and provide this service for others. Hayashi helped Travis Toyama a young fisherman in Hawaii by creating direct *gyotaku* of a fish that Toyama discovered. This is reported on the Hawaii News Network (Anon., 2012):

> "Toyama saw a strange fish floating in the water on December 23. What he mistook for an Eel, turned out to be a Slender Horned Armoured Gurnard. They are found in deep tropical waters around the world."

Figure 23 - Sashimi and vegetable *gyotaku* by Chef Masaharu Morimoto for the Vanity Fair Food Porn project, 2012. Image courtesy of www.vanityfair.com.culture/2012/10/masaharu-morimoto-iron.chef-iphone-food-photos

Hayashi was able to print two T-shirts and a canvas which was framed and explained:

> "What I am trying to do is not really duplicate it, as what a photograph would show. – I'm trying to capture the character (of it) so the person can relate to the day he caught it or found it, and then to live with it....It's the keepsake of the living experience."

Another of Hiyashi's services is providing customised surfboards for the local community (Figure 24). He works closely with the client to ensure the image and placement on the surfboard is perfect. Billabong, a well-known sports and leisure wear company worked in collaboration with the Hawaii based *gyotaku* artist Dane Kai Kondo to design a line of clothing in 2010. Kondo's *gyotaku* images can be viewed at (www.kondo*gyotaku*.net). Billabong produced a limited edition range of board shorts suitable for surfers and as beachwear which are decorated with reproductions of Kondo's *gyotaku* prints of fish with either a plain white or black background colour.

Figure 24 - Naoki Hiyashi in his studio with a completed surfboard in the corner. Photo courtesy of Eric Hochberg.

Books about fishing are occasionally illustrated using *gyotaku*. One example is called *Where the trout are all as long as your leg* written by John Gierach which is illustrated in black and white by the authors' direct *gyotaku* of fish made in Colorado, USA in the summer of 1990 (Gierach, 1991). A colourful publication was produced in 2012 entitled *Saltwater Flies of the Southeast and Gulf Coast*. This book contains text and photos by the author Angelo Peluso, who has been a fisherman for more than fifty years, and full colour *gyotaku* by the artist Charlie Brown (Peluso, 2012). A professional anaesthesiologist and keen fisherman Brown, first read about *gyotaku* in 2004 or 2005 and started to experiment he explained:

> "I thought it was interesting. I catch a lot of cool fish, so I thought I might try it. I bought inks and first tried it with my then little girls. It was fun and I kept experimenting." (Brickley, 2009)

Browns experiments rapidly turned into a small side business. He uses the direct technique and mostly tries to mimic the colours the fish has when first caught. He prints these onto a variety of papers from Mexico, Thailand, Nepal and Europe and handmade

papers from Japan. The 'Tower Gallery' in Sanibel Florida first exhibited his work and examples can be seen at '2 Islands Gallery' in Chadwick Square at the South Sea Islands Resort in Florida.

Technology which may help fishermen who are interested in *gyotaku* was developed by Waveon Co. Ltd., and released as a free download application (app) on the 5 January, 2010. The *Gyotaku* app (Figure 25) is compatible with iPhone, iPod touch and the iPad. It enables a GPS and map system to be used and claims that it is possible to make a digital fish print using this app.

Figure 25 - *Gyotaku* Application developed by Waveon Co. Ltd. Image courtesy of itunes.apple.com/br/app/*gyotaku*/id346527202?mt=8

Gyotaku has also been used to illustrate seafood cookery books. *Neptune's Table, Cooking the Seafood Exotics* published in 1997 is written and illustrated in the direct *gyotaku* technique by Don Hubbard (Hubbard, 1997). Since Hubbard saw an excellent example of a Japanese *gyotaku* at the library of the Scripp's Institution of Oceanography in 1968, he has printed over a thousand *gyotaku* of fish, shells, crustaceans and

cephalopods. Specimens are printed using water-based inks and then eaten at the end of a printing session.

The people who practise *gyotaku* like the art itself cross the boundaries of the fields of art, science and fishing and generally have a background in, and appreciation of one or more of these areas. Also, many have concerns for nature and the environment and ensure their aquatic specimens come from reliable sources and if edible they generally eat them at the end of a printing session. Many *gyotaku* practitioners pass on their knowledge about nature conservation and their printing skills by teaching *gyotaku* techniques and exhibiting their work (Figure 26). One such educator is the award winning illustrator, designer, and mentor Deborah Withey. Her *gyotaku* titled 'Double Image Plaice' has featured on the cover of ARTicle magazine issue Nº. 6 and inside the magazine to illustrate an article she wrote about her practice (Withey, 2010, pp.3-4). Other *gyotaku* works have been shown in numerous exhibitions and events. Withey, an American who now lives in Pembrokeshire, Wales, UK first encountered *gyotaku* as an undergraduate art student in America and made numerous prints. However, her work after graduation as a visual journalist meant that she rarely practised *gyotaku* or other hands-on forms of art until she moved to Wales in 2009. Withey teaches *gyotaku* classes at her Cheese & Pickle Studio in Wales and London and has designed the syllabus for printmaking classes at the local college, which includes *gyotaku*. Also, as part of Pembrokeshire Fish Week, an annual celebration of the maritime heritage of the county of Pembrokeshire she has provided *gyotaku* workshops and demonstrations.

Figure 26 - Direct *gyotaku* with additional painting by Deborah Withey advertising the exhibition at The Brick Lane Gallery, London from the 9th until the 20th October, 2013. Image courtesy of www.deborah-withey.com

As discussed contemporary *gyotaku* can remain as an original print or it can be transferred into other print mediums or manipulated and reproduced with digital technologies. This enables practitioners to create a range of two and three dimensional items on various substrates and print as limited or unlimited editions. *Gyotaku* printing techniques have also been adapted to create images using non-traditional printing materials such as those seen in the handmade ceramics methods developed by Reid Yoshida. As well as the possibility of manipulating and reproducing *gyotaku* images and using different materials, many practitioners use *gyotaku* techniques to create images for commissions or grant permission for particular images to be used in publications. One area in which *gyotaku* images are frequently utilised is fisheries science (Figure 27). Images can be used to illustrate articles and as the covers for scientific journals.

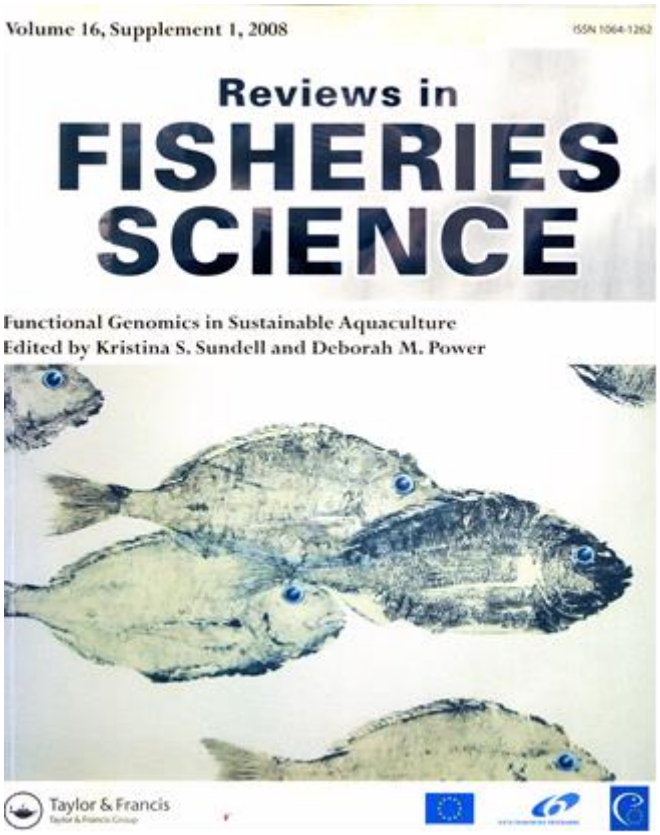

Figure 27 - Scientific journal cover with a direct *gyotaku* print 'Black Shoal Diptych' by the author, Rachel Ramirez. Photo by the author.

However, simple *gyotaku* impressions created by sports fishermen are still used today in some sports fishing contests in Japan to verify the size of the catch. These *gyotaku* are generally made in the direct method using black ink on paper. Information such as the common name of the fish, the name or signature seal of the fisherman, the weight, location, and the date of capture are usually written beside the image.

3. Visual Representations of Nature

3.1. Introduction

Humanity has created representations of nature for centuries. However, it is essential to acknowledge the influence of cultural perspectives, ideals, illusions and the era in which these images are created in order to appreciate them and comprehend their significance. In chapter two I aim to position *gyotaku* in the wider historical context of natural science illustration and artistic imagery associated with aquatic life forms as presently the oldest *gyotaku* extant are impressions of fish. Japan and Europe have assembled a vast body of knowledge concerning fishes and other classes of aquatic life and yet perceptions about these often differ due to cultural perspectives. A perfect example of this can be found regarding eels. Within Japanese culture eels are perceived as a nourishing, useful fish, especially being consumed throughout the summer months. It is thought to give people stamina and relief from summer fatigue called *natsubate* (Schweid, 2009). In many Japanese visual representations eels are portrayed as vivid, alive and delicious in their appearance. In contrast, although eel is eaten in many European countries it is generally not viewed as a delicacy. In London, eel is often associated with poverty and the working class that frequented the numerous 'Eel, Pie and Mash' shops that sprung-up throughout the city in the mid 1800's. Despite the city's cosmopolitan tastes of today the eel is generally viewed with repugnance, due to its external appearance:

> "Eastern and Western perceptions of eels could be termed contradictory, divided as they are into two extreme opinions. One sees eels as useful; the other sees them as frightening and weird. Whether emphasis is put on the objective view of a nourishing edible fish or on that fish's peculiar external appearance, resembling a snake, is a problem that clearly divides opinions of eels" (Aramata, 1990,

p.13).

One of the key components in creating representations of nature is the attitudes held towards it by a society and their perception of nature and the demarcation of the natural World. “Indeed, if humanity creates representations of nature, it is because nature is a constant preoccupation: it lives in people, as subject, and in the act itself of representing it, as object” (Berque, 1997, p.11). In this chapter I probe the difficulties encountered when viewing nature, particularly aquatic specimens, with the intention of clarifying how this may affect the methods and mediums used for recording and creating visual representations.

In consideration of the pluralistic role that *gyotaku* plays in the fields of art, science and sports fishing I evaluate the Japanese and European criteria for creating visual depictions of aquatic life. The advent of photography, new technologies and developments in printing has directly affected the production of visual imagery and our knowledge about aquatic life forms. I investigate the various methods used in the translation of ideas to demonstrate how these have affected the manner in which aquatic life forms are represented and displayed. Also, I explore the aesthetics and traditions which exist in icthyological illustrations to establish their affect upon *gyotaku*. Although it is often claimed that the natural science illustration of fish and aquatic life was uncommon in Japan, I argue that a tradition of scientific enquiry and illustration existed in Japan parallel to that of Europe's. Thus, providing greater clarity about the ways in which *gyotaku* crosses the boundaries of art, science and sports fishing and also how it can directly influence our understanding and knowledge of the natural world.

3.2. The Art of Science in Western Culture

In the past the terms 'art' and 'science' possessed a broader connotation of practice and experience. The Greek term *tekhne* and the Latin *ars* covered several areas of culture, which were only later differentiated into the areas of art and science. However, it was not until the 1830's in

Europe that the term science emerged in the modern sense, previously described as 'natural philosophy' or a curiosity for the natural world. Naming and categorizing the world around us has concerned humans since ancient times:

> "Whether for the most basic requirements of communal life or for the most sophisticated scientific exchanges, we have wanted to communicate information that we have gained about the world. Starting in the eighteenth century, however, a particular approach to this activity emerged as a scientific discipline in Europe and has continued to the present day, the modern tradition of natural history" (Farber, 2000, p.1).

One of the most effective ways in which to communicate information, particularly natural history is with visual imagery, regardless of whether this imagery is described as an illustration or visual art, or models or sculptures. Scientific illustration as it is known today, developed not only as a means to communicate information, but also with the advances in printing technologies and materials, and the reciprocal influence of culture and our understanding of the world. Gradually, as with the terms 'art' and 'science' scientific illustration divided into categories for example; medical illustration, wildlife illustration, botanical art and natural science illustration. Each category has its own particular merits and illustrators or artists produce works in either two dimensions or three dimensions, which can be reproduced in printed publications, exhibitions, murals, models, the World Wide Web, and CD-ROMs. In each category of scientific illustration, communication and accuracy are essential and the combination of observational skills, technical ability, aesthetic realisation and some scientific knowledge need to be mastered in order to produce an illustration of any value:

> "Imaging and imagery can help scientists in many ways: to understand structures that are too small to be seen with the naked eye, or perhaps to elucidate the relationship between structure and function, or even to illustrate abstract ideas that are otherwise difficult to grasp. Images also form a bridge, a way in which non-scientists or indeed researchers in a separate discipline may be able to appreciate concepts that are otherwise quite esoteric. But as well as deepening understanding, the art of science can be – beautiful and awe-inspiring." (Roberts, 2009, p.1)

It is difficult to categorise *gyotaku* in the context of scientific illustration as the terms 'natural science illustration', 'botanical art' and 'wildlife illustrations' are equally suitable. In spite of

the limitations of *gyotaku* techniques they can be used to accurately portray the anatomy, shapes, colours and patterns which exist in a wide range of aquatic life. However, none of the three *gyotaku* techniques are appropriate for portraying the internal anatomy and structures of aquatic specimens. Several *gyotaku* artists have portrayed the skeleton or cartilage of fish with the head and tail intact. Chris Dewees created a direct *gyotaku* print on paper which features the heads and backbones of two fish. The title of the print is Mortality (Figure 28) and formed part of his exhibition ''Fishes of the Pacific Rim' held at international House in Davis, California, from June 13 – July 9, 2008.

Figure 28 - 'Mortality' direct *gyotaku* by Chris Dewees. Image courtesy of www.deweesnaturedesigns.com

Gyotaku can also be employed as a technique to create accurate 'botanical art'. Mineo Yamamoto uses the word *gyotaku* not to define the subject matter but as a means of describing printing techniques. Yamamoto teaches classes in *gyotaku* for marine life and botanical art in his studio in Japan and across the world. With help from scientists and pet owners he has printed a tiger, snakes, a pet poodle, a small horse and marine mammals such as penguins, seals and a juvenile whale. Some of these images can be seen on his website at www2a.biglobe.ne.jp. These images could easily be described as 'wildlife illustrations'. Recently, in 2013 Yamamoto created an indirect *gyotaku* of a human skeleton printed in white ink on dark blue fabric and it could serve as a

'medical illustration' if it were not for the presence of some humorous additions. For example the skull was not printed and was replaced by a man's face holding a yellow rose in his mouth.

Given that *gyotaku* was first used to record images of fish it is most beneficial to investigate the historical illustrations of fish in order to gain an insight and a general overview of ichthyology illustration in the West, and some of the people who played a major role in its development. The ichthyology illustrations that will be discussed are produced by painting, drawing and printing:

> "Ichthyology the scientific study of fish, began with the Greek philosopher and scientist Aristotle. In the fourth century BC he set about cataloguing the natural world, a process which continues to this day. Aristotle's catalogue included 115 kinds of fish, all that were known then, and not until the renaissance were significant additions made to it." (Dance & Swinney, 1990. p.5)

During the mid-sixteenth century virtually all the fish known in Europe came from the Mediterranean and the eastern Atlantic. One of the first illustrated books about fish was published in 1554 -1555 by the anatomist and naturalist Guillame Rondelet (1507-1566). The title *'Libris de Piscibus Marinis, in quibus verae piscium effigies expressae sunt*' refers to fish (*Pisces*) but in a similar fashion to his contemporaries, Rondelet made no distinction between marine mammals, invertebrates and fish (Dance & Swinney, 1990). The book contains two hundred and fifty descriptions of marine animals including whales, seals and marine invertebrates and nearly the same number of uncoloured illustrations produced by woodcut prints. In 1558 the book was translated into French and published under the title of 'L'Histoire entière des poissons' (The Complete Story of Fish). Rondelet dissected, examined, described and illustrated numerous creatures and compared the swim bladders of marine fishes to those of freshwater fishes. He noted the similarities between dolphins, pigs and humans.

Naturally, with today's advances in marine science and new technologies, opinions differ regarding Rondelet's work. Nicholas D. Holland of the Marine Biology Research Division, Scripps Institution of Oceanography, University of California at San Diego in the USA, claims that:

> "Rondelet (1554) published a woodcut of a crudely dissected sea urchin showing some fragments of

> the digestive system. However, accurate renditions of the echinoid anatomy did not become available until early in the nineteenth century. This initial descriptive phase was completed by Delle Chiaie (1825), who correctly described and illustrated a sea urchin digestive system complete with its siphon" (Lawrence, 2007, p.119).

In contrast, Barbara Charton (2008, p.336) praises Rondelets' work stating:

> "His description of the sea urchin is excellent and a worthy complement to that of Aristotle. Rondelet's drawing of this creature is the earliest extant depiction of an invertebrate."

However, Rondelet and his contemporaries Pierre Belon (1517-1564) and Ippolito Salviani (1514-1572) are generally considered to have produced more accurate descriptions and illustrations for their works on fishes than others investigating the subject at that time. Two hundred years later Carl Linnaeus (1707-1778) the Swedish botanist, physician and zoologist responsible for the scientific classification system widely used in the biological sciences called 'Linnean taxonomy', listed four hundred and fourteen species of fish (Farber, 2000).

With the expansion of European trade, artists were often employed by large companies such as the Dutch East India Company:

> "The company was wealthy and powerful, and within its domain it functioned as a governing body separate from that of the Netherlands. Its zealous exploitation of the native inhabitants of the Spice Islands, as well as its efforts to maintain a monopoly against competing companies, particularly the English East India Company, caused untold pain and suffering. Yet in other ways, the Directors of the Company were enlightened men, patrons of art and science, not only for reasons of acquiring further wealth but also of gaining knowledge itself" (Pietsch, 2010, p.6).

Samuel Fallours, one of the Dutch East India Company artists created a number of original fish paintings in Ambon, the Moluccas Islands in Indonesia, during a six year period. Fallours paintings and several other artists' renditions were used by Louis Renard, a publisher, book dealer and agent to the British Crown based in Amsterdam. These illustrations and descriptions became important reference materials as they formed the basis of the first book issued with coloured illustrations, 'Poissons, Ecrevisses et Crabes'. Published in 1719 in Amsterdam, it contains 460 hand coloured copper plate engravings representing 415 fish, 41 crustaceans, one dugong, one mermaid and two stick insects. Although Fallours illustrations have been widely criticised for their fanciful

animals, inaccuracy and arbitrary application of colour, Theodore W. Pietsch argues that to better understand Fallours work it should be placed in the context of historical illustrations of fishes and "until a century after the advent of the printing press and a time when enlightened people began to realise the importance of depicting nature as it really is" (Pietsch, 2010, p.22). Pietsch further testifies that:

> "only approximately 10 percent of the total number of 460 illustrations fall into a category that might be referred to as truly fantastical. Thus, to dismiss Fallours work as having no scientific merit is greatly to underestimate its value. In addition to its historical importance as one of the rarest natural-history books known, as well as the earliest-known work on fishes to be published in colour"

He explains that it is possible to examine the works in the context of present day knowledge and it also gives insight into science of the late seventeenth and early eighteenth centuries.

Fallours claimed to have drawn directly from nature and there is ample evidence from the same era that the Englishman, Mark Catesby, (1682-1749) was inspired in a similar way. Catesby made hundreds of field sketches and observations directly from nature and he "intended nothing less than a comprehensive survey of the flora and fauna native to the eastern seaboard of North America" (Attenborough et al., 2007, p.195). He published 'The Natural History of Carolina, Florida and the Bahama Islands' in parts between 1729 and 1747. This contains many accurate and colourful illustrations of fish, the majority created in 1725 (Figure 29) when he visited the Bahamas. Catesby produced watercolour studies in the field and he describes the problems involved in trying to replicate the colours of fish. "Catesby writes in the introduction to his book that 'Fish which do not retain their colours when out of their element, I painted at different times, having a succession of them procured while the former lost their Colours" (Attenborough, et al, 2007, p.195). Once he returned to England in 1726 he used his notes, watercolours and preparatory drawings and descriptions, to prepare his natural history book. He believed that the illustrations were of greater importance than a written description and his work was highly praised at the time. "Cromwell

Mortimer, Secretary of the Royal Society described it as 'the most magnificent work I know since the Art of printing has been discovered"' (Attenborough et al., 2007, p.211).

Figure 29 - A great hogfish, *Lachnolaimus maximus*, c. 1725 by Mark Catesby. Image in the common domain.

Peter Artedi (1705-1735) the so called founder of modern ichthyology, met and became friends with Linnaeus when they were students at Uppsala University in Sweden. In 1734 Artedi arrived in England and was able to examine the fishes in Sir Hans Sloane collection which later formed the foundation of the collection of the British Museum. Artedi is thought to have completed his manuscript *Catalogus Picium Maris Balthici* in London, which he presented to Sloane. In 1735 Artedi arrived in Holland where he was planning to study for a doctorate in medicine. However, he met his friend Linnaeus in Leiden who was able to introduce him to a wealthy apothecary in Amsterdam, Albertus Seba (1665-1736). His large collection of preserved natural history specimens was well known and the penniless Artedi was employed by Seba to write the descriptions of fishes for the third volume of his 'Thesaurus' (Müsch & Rust & Willman, 2011). Unfortunately, this was not completed as Artedi accidentally drowned in a canal in Amsterdam. His friend, Linnaeus, was

eventually able to retrieve five of Artedi's manuscript and published these in 1738 as *Ichthyologia*. Alwyne Wheeler (1987, p. 6) reports that:

> "He capably reviewed the earlier literature on fishes, clarified the synonymy of known species, provided a synoptic treatment of the genera, accurately described more than seventy species of European fish. But above all established the fundamental principles which he employed himself and on which systematic ichthyology would depend for the next two centuries."

Marcus Elizer Bloch (1723-1799) a German medical doctor is considered to have produced one of the most important works on ichthyology in the eighteenth century. He first became interested in fish at the age of fifty six when he realised that the available published literature could not help him identify a particular German fish. His natural history work *Allgemeine Naturgeschichte der Fische* was first published in Berlin between 1781 and 1795. The twelve volumes contain over two hundred species of fish which he described for the first time accompanied by hand coloured copperplate engravings. A number of artists and engravers including Ludwig Schmidt, Gabriel Bodenehr, Krüger junior, Johann Gottlieb, Pater Plumier and J.F. Henning were involved with this task (Baione, 2012). Some of the engravings have been highlighted with gold, silver and bronze to imitate the metallic sheen of the fishes scales. The first three volumes describe German fish and the remaining volumes describe fish from other parts of the world.

In France, Georges Cuvier (1769-1832) and his pupil Achille Valenciennes (1794-1865) published twenty two volumes of their work *Histoire Naturelle des Poissons* from 1828 to 1849. They attempted to summarise everything that was known about fish at that time. They employed a team of artists, engravers and colourists and together they attempted to describe and illustrate over four thousand five hundred species. However, their work was never completed despite some posthumous publications after Cuvier's death in 1832, as they had already come to the conclusion that the field of ichthyology had already become too large a subject to be dealt with in a single work. In fact Joseph S. Nelson in his work *Fishes of the World* first published in 1976 records the number of extant fish at no fewer than eighteen thousand eight hundred and eighteen (Nelson,

2006). Today browsing the acclaimed website 'FishBase' it states there are thirty two thousand seven hundred species of fish.

Early discoveries in natural history were intrinsically linked with the expansion of European imperialism and colonial development. Opportunities arose for naturalists to travel, often as part of naval expeditions, to exotic regions. In the early nineteenth century some of the first trained naturalist exploited these opportunities and brought back specimens for both private and museum collections. It was not only professional naturalist but also interested amateurs who contributed to scientific knowledge by providing written descriptions and illustrations and in some cases collecting and preserving specimens. For example John Whitchurch Bennett (1808-1843) produced a manuscript album with original watercolours titled ‘A Selection from the Most Remarkable and Interesting Fishes Found on the Coast of Ceylon'. It consisted of original coloured drawings and observations from the marine life which he observed first hand in Sri Lanka. Bennett made use of metallic varnishes to give a better imitation of the dramatic colours of live fish. Each watercolour drawing is carefully cut to the outline of the fish and mounted onto card to give a uniformity of appearance (Baione, 2012). The text included the scientific names and the local names (in Singhalese). The 1830 edition 'Fishes of Ceylon' published in London was issued in six parts from May 1828 to April 1830. The copperplate engravings faithfully reproduce the colouring and form of the original watercolours, a few have been reduced in size to fit the printed publication (Dance & Swinney, 1990). Another amateur, the Reverend Richard Thomas Lowe (1801-1874) published 'History of the Fishes of Madeira' between 1843 and 1860, which contains coloured and uncoloured (Figure 30) reproductions created by the Hon. C.E.C. Norton and M. Young.

Chromolithography was used to reproduce the illustrations for Peiter Bleekers book the *Atlas Ichthyologique*. This was printed in several volumes between 1862 until Bleeker's death in 1878. Bleeker began to study fish as a hobby when he was employed as a medical doctor in the

Dutch East India Army, stationed in Indonesia. He collected over twelve thousand specimens and wrote over five hundred publications. Today, he is considered one of the most influential ichthyologists. To honour him 'The Bleeker Award' was established in 2005 for distinguished contributions to Indo-Pacific Ichthyology.

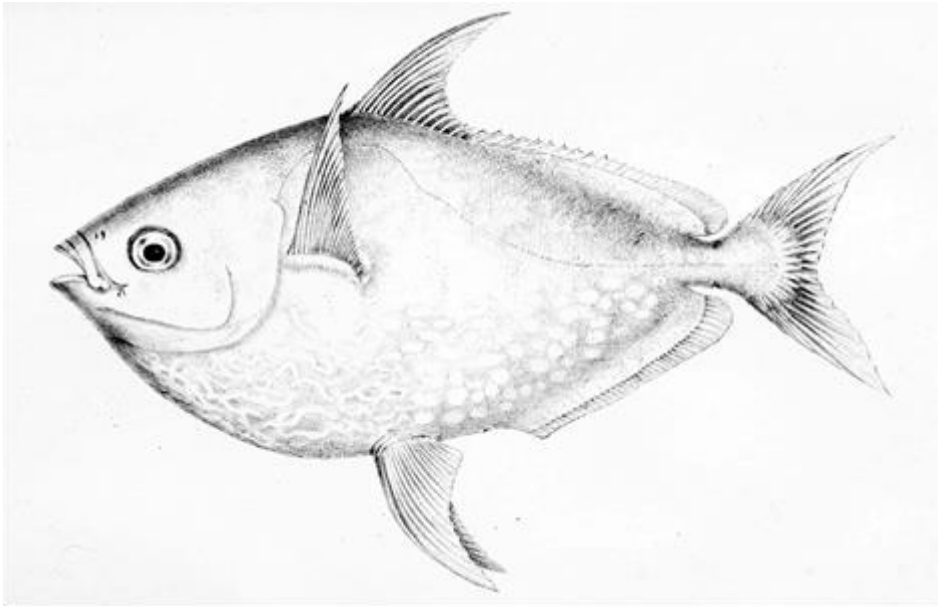

Figure 30 - *Lampris lauta* from page 26 of 'A History of the Fishes of Madeira'. Image in the public domain.

Whether professionals or amateurs there is no doubt that the individuals discussed have furthered scientific knowledge in the field of ichthyology. Working with engravers or lithographers and sometimes artists, (if they did not draw the works themselves), has led to a wealth of Western scientific illustrations. Gradually a particular style, aesthetic and standardisation in the visual representations of specimens developed. Furthermore, the scientists names are remembered but those who collaborated in producing the illustrations are sometimes forgotten. A great deal is known about Western scientific illustration because it was reproducible by the medium of printmaking

William M. Ivins (Ivins, 1953, p.161) argued that “Communication is absolutely necessary for scientific and especially technological development, and to be effective it must be accurate and

exactly repeatable." According to Ivins "trying and testing" a fundamental part of the scientific process required exact repeatability of communication and this was supplied by prints. Illustrations for ichthyological albums and manuscripts developed from simple black and white woodcut prints to hand coloured copperplate engravings and chromolithographs. However, prints are not the only means by which scientific knowledge can be illustrated and communicated as is evident in the development of ichthyological illustrations found in Japan.

3.3. The Art of Science in Japanese Culture

> Hiroshi Aramata explains in his book Fish of the World that one of the reasons that so little is known about early Japanese natural history illustration of fishes is that books such as Shurinzu (Pictures of a Multitude of Scales 1760-2, final edition) were not printed as was customary in Europe and the USA. He states "This unfortunate circumstance is not limited to this book, but applies to all books of fish illustrations in Japan" (Aramata, 1990, p.10).

The production of *Shurinzu,* the first Japanese illustrated book of fishes in colour, was ordered by the 5th Lord Matsudaira Yoritaka of Takamatsu in the Shikoku region. Hiraga Gennai (1728-1780) one of the most well-known and gifted natural historians in Japan during the Edo period, directed and organised the project as he was in the service of Lord Matsudaira. He was able to gather information for the plan of the book and means of identifying the fishes and marine invertebrates during a journey to Edo (modern Tokyo) when he visited all of the natural history collections along the way. Once in Edo he liaised with his friend the painter Sō Shiseki[7] (1715-1786). Sō Shiseki was a prominent representative and teacher of the Nagasaki and Nanpin schools who specialised in detailed, realistic 'bird and flower' paintings (Lippit, 1980). Together they selected Bunryu Miki one of Sō Shiseki's pupils to produce paintings for the book. It is thought that Bunryu may have visited the fish markets in Nihonbashi to acquire specimens for painting and in the space of two years finished painting a prototype. For several years the prototype went back and

7 Sō Shisekis' real name was Kusumoto Sekkei, his artists name derives from his teacher the Chinese painter Song Ziyan called Sō Shigan in Japanese.

forth from Edo to Takamatsu and during this period several other paintings were added. Some of the pages are left blank and it is assumed that these were intended for the addition of further images. *Shurinzu* could be classified as a paper model book because the majority of images appear to have a three dimensional quality. The paintings were created on several layers of paper which were lacquered, cut out in the shape of the fish and attached to the book with further sections added. *Shurinzu* contains seven hundred and twenty three images of fish and marine invertebrates and is currently considered to be one of the most valuable properties of the Kagawa Prefecture and it is usually closed for inspection at the Historical Museum in Takamatsu. The accuracy and aesthetic qualities of such illustrations has led to their use in contemporary publications. For example the museum granted permission for two of Bunryu's images from *Shurinzu* to be reproduced in a scientific book entitled *Echinodermata.* A colour drawing of a Sea Cucumber is shown which the text states "appears to be *Apsotichopus japonica"* and "The starfish is recognized as *Asterina pectinifera"* (Matranga, 2006, p.261).

Unfortunately, many of these natural history albums, scrolls and manuscripts are not on permanent display in Japan due to their conservation requirements. None the less a recent exhibition held at the Tokyo National Museum in Japan, 27th August until 20th October 2013, enabled the public to view a range of natural history albums including illustrations of plants, animals and fish. These natural history albums (*hakkubutsu zufu*) are collections of illustrations connected to the study of natural science, and are either drawn from nature or copied. In Japan, the rise of natural science was sparked by a national-scale survey of agricultural produce conducted during the Kyoho era (1716-35) by the Tokugawa shogunate government (Vande Walle & Kasaya, 2001).

One of the albums on display was *Ryokuiken, (*A Natural History Album of Animals) by Kurimoto Tanshu, Sekine Untei, et al. Kurimoto Tanshu also known as Kurimoto Masayoshi (1756-1834) produced a vast quantity of natural history illustrations including fish, marine

invertebrates and crustaceans. Adopted by the Kurimoto medical family he studied medicine becoming the physician to the 11th Tokugawa Ienari shogun and lectured on *materia medica.* Kurimoto was the second son of Tamura Ransui (a.k.a. Genyu) (1718-1776) a naturalist and Hiraga Gennai's teacher (Keyes, 2006). It is assumed that from an early age Kurimoto was exposed to gatherings of natural historians who met to discuss ideas with like-minded people. For twenty years Kurimoto devoted himself to the study of insects and fish and one of his most well-known works is *Risshi Senchufu,* sometimes called *Senchufu* (1000 Insects Picture Book) which was completed in 1805 and contains pictures of fish, amphibians and other animals besides insects (Figure 31). Hugh Raffles (Raffles, 2011, pp.371-372) claims *Senchufu* "is one of the incomparable treasures of the period, painted from life to produce portraits of insects and other creatures that not only were outstanding in their delicacy and precision but also were organised serially in a way that prefigured the arrangement of *zukan* guides used by insect collectors today."

Kurimoto's' fish images provided an invaluable reference point which were copied by many artists and later scholars such as Okukura Tasuyuki, a.k.a. Kougaya Chouemon (b.? -1859) and Takagi Shunzan (b. ? - 1852). Today the National Diet Library in Japan holds several of Kurimoto's original paintings including some fish under the headings; *Gyofu* - 51 images of stingrays and unusual fish, *Gyofu* - 60 pages of assorted fish (2 scrolls), *Igyozusan/Seikaihyakurin* - 60 images of fish in two volumes, *Igyozusan* – a folding scroll with 10 images of unusual fish, *Kare zui* - 38 images of flat fish, *Mamboukou* - 18 images from a book about sun fish, *Tako-kurage-ika- rui zumaki* - 16 pages of jellyfish, otopi and squid. Even though these early natural history albums and books of fish were not generally printed the interest from scholars and nobles in the fields of pharmacology, natural history and science provided the impetus for their continued production.

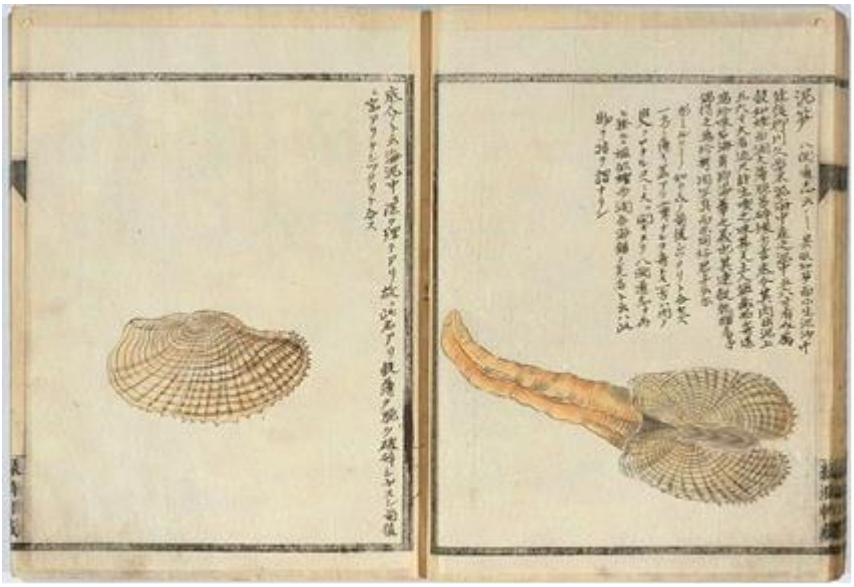

Figure 31 - Illustration of 'Umitake' Bamea *dilatata* from *Senchufu* by Kurimoto, c. 1804. Image in the common domain.

It is often said that Japan was a closed community and this may give the impression that Japan was utterly closed to foreigners and foreign information. However, this is not totally true as the Japanese had intermittent contact and trade with a variety of Europeans and Chinese. Referred to as *Nanban bōeki jidai* the *Nanban* (southern barbarian) trade period began when the first Europeans, the Portuguese, reached Japan in 1543. Shortly afterwards the Spanish arrived and in 1600 the first Dutch arrived in Japan. The first English man to reach Japan was William Adam who was the pilot of the Dutch ship called *Liefde* (Love). The first British ship arrived in Japan in 1613 (Screech, 2012). It is important to note that even when various Europeans were banished from Japan a steady flow of European objects and knowledge continued to enter the country aboard the trade ships from China. The Dutch East India Company, VOC; *Verenigde Oostindische Compaigne* provided artefacts and knowledge from various European countries, not only the Netherlands, when other Europeans had been banished from Japan. A trading factory was established at Deijima, an artificial island constructed in the bay of Nagasaki, Japan for the purpose of controlling trade and foreign contact. Haraga, Sō Shiseki and Kurimoto all had an active interest in foreign cultures and were involved in *Rangaku* or Dutch Studies. However, the problems with understanding often

related to the subtleties of language and the translation of Dutch into Japanese. Timon Screech describes some of these problems:

> "Rangaku (gaku meaning learning and Ran being short for Oranda). Holland was synecdoche for all of Europe on account of its prominence in East and South-East Asia. Throughout eighteenth-century Japan to talk of the West was to assert the ways of Holland. Those embarking on Rangaku had to contend with several factors, most immediately the difficulty of the language; this disincentive diminished from the 1760's with the emergence of a body of published and manuscript commentary in Japanese" (Screech, 2002, p.6).

The exchange of information and objects between the Japanese, Dutch, and foreigners in the Dutch enclave played a major role in Europe's understanding of natural history in Japan and vice versa. Engelbert Kaempfer (1651-1716) a German naturalist and physician worked for the VOC and in 1691 and 1692 he was able to travel with the Dutch delegation on the annual visit to the Shogun in Edo (modern Tokyo). It was during these journeys which took more than eighty days that Kaempfer collected information and natural history specimens and in 1693 he is thought to have brought the first Japanese books to Europe (Screech, 2002). The prohibition on importing books, which operated in Japan, to prevent the spread of Christian ideas was relaxed in 1720 by Shogun Tokugawa Yoshimune. This lead to an increase in book imports and the study of their contents and translation into Japanese. Therefore, scholars were able to gain access to more European information. Eighty three years after Kaempfer left Japan his successor Carl Peter Thunberg (1743-1828) arrived in Dejima, Japan in August 1775 where he was appointed as head surgeon (1775-1776). Thunberg accompanied the director of the VOC on a journey to visit the Shogun in Edo and during the journey he collected a number of natural history specimens particularly plants. Thunbergs' friendship with the *Rangaku* scholars' Katsuragawa Hoshu, (1751-1809) a physician to the Shogun and Nakagawa Junan (1739-1786), a physician and botanist enabled him to establish the Japanese names for plants and natural history specimens and provide their Latin and Dutch names (Vande Walle & Kasaya, 2001). The results of his scientific activities in Japan were published as *Flora Japonica* in 1784. Thunberg had been a pupil of Carl Linnaeus at Uppsala University but it is

unclear if he introduced the Japanese to the Linnean taxonomic classification. This uncertainty is highlighted by Akihito, His Majesty the Emperor of Japan, in his speech presented to the Linnean Society, London in May 2007.

> "We do not know exactly when the scientific names under the binomial nomenclature, originated by Linné, were first introduced to Japan. As I mentioned earlier, Thunberg writes in his book that he taught Katsuragawa Hoshu and Nakagawa Jun-an the Latin names of plants. It is my view, however, that some doubts remain to conclude, from what Thunberg writes in his book, that the scientific names were first introduced to Japan at that time" (Akihito, 2008).

By the time that the highly influential *Kinka gyofu* (Book of fish) compiled by the famous physician and naturalist Ito Keisuke (1803-1901) was produced Latin names were often used beside Japanese names and Chinese names. Kinka was Ito's pen name as well as Taigyo and Shunmin and in 1827 he studied botany under the German doctor Philipp Franz von Siebold (1796-1866). Based on Thunbergs' *Flora Japonica* presented by Siebold he wrote *Taisei honzo meiso,* in which he introduces the Linnean plant classification system for the first time in Japan. Ito was a professor at the University of Tokyo from 1881 and became the first doctor of science in Japan in 1888 (Goodman, 2000). In the book *Kinka gyofu,* an illustration of a red cornet fish has a note written by Siebold in pencil, '*Fistularia tabacaria* Dr. von Siebold' (Figure 32), the current scientific name of this fish, which is easily recognisable from the illustration is *Fistularia petimba.* Siebold wrote in his diaries about his journey to visit the Shogun and that a picture of a five foot Red Cornet Fish attracted his attention (Kouwenhoven & Forrer, 2000). This illustration was inherited by Itos' grandson Tokutaro and was exhibited in 1935 at the Tokyo Science Museum in Japan as part of the 'Exhibition of Siebold Materials'. An equally important exhibition of ichthyological illustrations, entitled *Van Haai tot koi,* (From Shark to Koi), was held at the SieboldHius Museum in Leiden, the Netherlands from the 6th April until the 8th July 2012. The exhibition presented Japanese fish illustrations that have rarely been on public display and many of the watercolour paintings by the artist Kawahara Keiga, also called Taguchi, Takumi or Toyosuke (1786-1860) were on show to the public for the first time. Keiga was a highly skilled painter appointed to the VOC at Deijima. The

exhibition display explains how Siebold collected and preserved his specimens of fish and other aquatic life, how they were described and recognised as new species in the Netherlands, how they were illustrated in the book *Fauna Japonica* and how they were shipped to the Netherlands. In 1829 Siebold sent five hundred and forty Japanese fish of two hundred and fifty five species preserved in alcohol and some mounted fish skins to the Netherlands. It is noteworthy that unlike European illustrations which were generally field sketches and prints whose dimensions were dictated by economics and print technologies, the painted Japanese images are on a much larger scale and include for example, a two meter long shark and an approximately one and a half meter illustration of a sunfish.

Figure 32 - Above, the note written in pencil "*Fistularia tabacaria*. Dr. Von Siebold". Below, a red cornet fish in the *Kinka Gyofu*. Image courtesy of National Diet Library Newsletter, p. 149, June, 2006.

Many accurate and informative descriptions and illustrations of aquatic life were produced by untrained amateurs in Europe and the same was true in Japan. Okukura Tatsuyuki also known as Kougaya Chouemon (?-1859) was a greengrocer and a particularly prolific and skilled illustrator.

His work *Gyosen suizoku shashin* contains more than seven hundred and twenty pictures of saltwater and freshwater fish, a native Japanese crab, *heike gani* and several jellyfish. The images are accompanied by text indicating the species name, and some variants of names in different dialects, anatomical characteristics, breeding patterns of the fish and the flavour. The title of this fish book includes Okukura's sobriquet *Gyosen* which means 'fish wizard' and the word *shashin* which means detailed, realistic depiction or more accurately *sha* means transposition and *shin* means of the real (Figure 33). In contemporary Japanese language *shashin* signifies photography. This word *shashin* is romanised and forms the title of the unpublished manuscript *Honzō Sjasin* compiled in 1826 by the scholar Mitzutani Hobūn (1779-1833). Siebold had the manuscript transported to Europe in 1829 when he was expelled from Japan. Currently held in the Special Collections of Leiden University Library, in the Netherlands it forms part of the Siebold collection. The 1845 catalogue compiled by Siebold describes the manuscript as consisting of "botanical sketches according to nature drawn by Mitzutami Sukeroku. (Sukeroku is Mitzutanis' common name)" (Fukuoka, 2012, p.17) and he suggests that Hōbun and others made these images. Maki Fukuoka (Fukuoka, 2012, p.17) examined the images first hand and declares in her book *The Premise of Fidelity* that these particular botanical illustrations are very different from others produced at that time. Normally *materia medica* publications were printed in Chūban (26 x 19 cm) but those contained in *Honzo shashin* are in Oban size (39 x 26.5 cm). There are seventeen illustrations in total but one which is particularly noteworthy and could have some bearing on *gyotaku* is described as follows:

> "At first glance these appear to be fully hand-painted illustrations. Close inspection, however, reveals that they were, in fact, created by a rather unusual method. Deep indentations, clearly visible under natural light, surround each illustrated plant like an outline. In some cases the paper even bears the fine impressions of the stamen and pistil, details best seen in the spidery network of ridges on the reverse of the page."

Fukuoka describes a number of ink rubbing images of plants made by Itō Keisuke and Udagawa Yōan in 1827. The ink rubbing techniques amongst others were used by the scholarly group *Shōhyaku-sha* whose members were involved in the study of *materia medica.*

Figure 33 - Herring from *Gyosen suizoku shashin* by Okukura Tatsuyuki. Image in the Common Domain.

Not only is there evidence of images being produced by pressing and inking genuine plant specimens as outlined in Fukuoka's studies, but evidence exists in art prints such as 'A Snake and a Frog on a Burdock Plant' printed by Hokusai Katushika (1760-1849) and signed as *Itsu Rōjin* with a personal seal *Manjin Rōjin*, dated 1830-1835. Lubor Hajeck (Hajeck, 1989, image 89) states in his book 'Japanese Graphic Art' “It would be an exaggeration to claim that Hokusai had invented the technique of monotype, but here, apparently Hokusai had made a transfer print of a burdock leaf, and then added with quick brush-strokes a snake and a frog.” This may suggest that in the fullness of time earlier *gyotaku* images of fish may be discovered as the Japanese techniques for printing plants are very similar to that of direct and indirect *gyotaku*.

3.4. Communicating Ideas and Knowledge

Science is more easily understood with visual imagery which provides further information and enlightens the viewer enabling a better understanding of a subject. As explained by Dr. Lucy Nowell the Program Director of the data, data analysis and visualisation office of cyberinfrastructure at the National Science foundation, USA:

> "You can do science without graphics but it is very difficult to 'communicate' it in the absence of pictures. Indeed some insights can only be made widely comprehensible as images. How many people would have heard of fractal geometry or the double helix or solar flares or synaptic morphology or the cosmic microwave background if they had been solely described in words?" (Nowell, 2008, p.15)

In any discipline images play a fundamental role in the communication of ideas and knowledge, regardless of how these images may be classified, whether they are referred to as illustrations or art, animations, sculptures or models. Debates exist over the terminology applied to illustrations used for scientific purposes as many are created from sketches alongside written descriptions and may be in various states of detail or completeness. These works are generally referred to as 'preliminary'. All of the 'preliminary' studies or various parts of these works may be used to form the final finished rendering in any medium, ready for publication in a number of formats. Scientific illustrations can be produced by the scientist to illustrate their own work or may be the result from a collaboration between the scientist or other client and the illustrator (Martin & Thurstan, 2009). The scientific illustrations serve to further scientific concepts and provide visual insights, which may be overlooked on not perceived with a textual description alone. Both the scientist and illustrator require an understanding of their subject and good communication skills for a successful project outcome. Adam Cohen and Ben Labay known as 'Inked Animal' have made numerous observational insights by producing a range of direct *gyotaku* impressions including; fish, birds, insects, mammals, plants, skulls, amphibians and reptiles which can be viewed on their website at www.inkedanimal.com. Cohen and Labay are Fisheries Biologists at the University of Texas and in their spare time they work together to create direct *gyotaku* impressions. In an

interview given in 2012 to Hayley Gillespie the owner and director of the Art Science Gallery in Austin, Texas, Cohen states:

> "We inked a Menhaden recently and as the ink settled into the pores we noticed the incredible network of sensory canals of the head that allows the fish to sense near-by fish and form dense schools. Also recently while printing a Guadalupe bass we noticed the relatively small cheek scales that the ink made much more evident. This is a character used to differentiate this species from the largemouth bass. Interestingly enough, we first learned about that character from Joseph Tomelleri, a well-known fish illustrator. I'm guessing he knew about that character due to the careful observation needed for his art. That's a character I haven't seen in any fish ID books. Fish biologists often use inks and dyes as tools for intentionally doing these kind of things, so I don't think we are doing anything cutting edge or making new discoveries for science (although we could), but it certainly helps in my education and makes me a better observer and scientist" (Gillespie, 2012, n.p.).

As observed by Cohen and Labay, *gyotaku* (Figure 34) can reveal and depict characters which are often overlooked and not found in other sources of ichthyological illustrations.

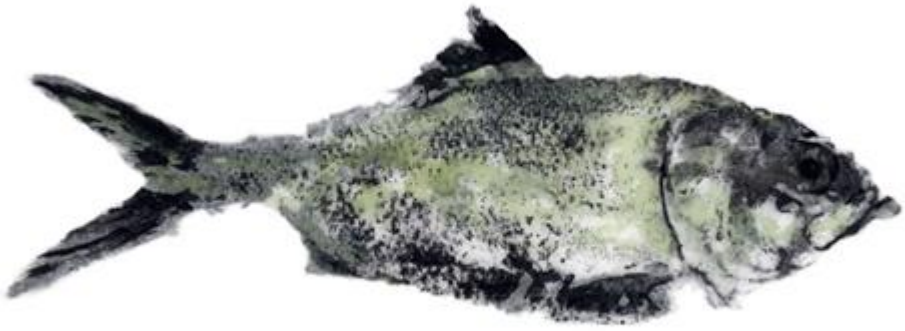

Figure 34 - Direct *gyotaku* of a Gulf menhaden, *Brevourtia patronus*. Image courtesy of Inked Animal.

Stanley H. Weitzman[8] expresses corresponding views to those of 'Inked Animals' noting the role that observation plays in identifying the different species of fish. He writes in the second edition of 'The Guild Handbook of Scientific Illustration':

8 Stanley H. Weitzman was the Curator and Research Scientist at the Department of Systematic Biology, Division of Fishes at the National Museum of Natural History, Smithsonian Institution, Washington, DC at the time of publication of the 2nd edition of The Guild Handbook of Scientific Illustration. The late (1997) Marion J. Dalen co-authored the 'Illustrating Fishes' article for the original edition of the book.

> "Depicting taxonomic characters needed for identification and that distinguish closely related fish species often requires precise presentation of small differences in the number of scales, fin rays, teeth, bony prominences, soft fleshy papillae, skin flaps, barbels, colour pattern and the relative position of the jaw bones, fins and other body structures." (Hodges & Buchanan & Cody & Nicholson, 2003, p.367).

Another example of scientists understanding the most appropriate medium with which to represent their work is demonstrated in the collaboration between Emeritus Professor Mitsuo Fukuchi a marine ecologist and universally recognised authority on polar marine ecology and Professor Harvey J. Marchant a biologist and international authority on Antarctic biology and the '*Gyotaku* Master', Boshu Nagase in their book 'Antarctic Fishes'. Marchant declares in (personal communication, October 28, 2012) that:

> "The reason we chose to use *gyotaku* in our book is that we both know Boshu Nagase and his work. As we described in the introduction of "Antarctic Fishes" we wanted to produce a book to mark the 25th anniversary of the first meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). As Fukuchi-san and I both deeply appreciate *gyotaku* as an art form there was no question that that was the form for illustrations in the book. We see "Antarctic Fishes" principally as an art book rather than a technical/scientific book. Having said that all the details of the fish and their environment mentioned in the book are technically correct. There are several scientific books which cover in detail Antarctic fishes and their ecology. We did not want to duplicate any of this work but to present Antarctic fishes in a way that had not been done before. Importantly we were keen to present Antarctic fish and the art of *gyotaku* in a form that is readily accessible to the general public. How many people are aware of the diversity of Antarctic fish and aware of *gyotaku*?"

Figure 35 - An example of indirect *gyotaku* by Boshu Nagase. Image courtesy of © Oceanographic Museum Monaco.

The works produced by 'Inked Animal' using the direct *gyotaku* technique and those by Master Boshu Nagase created using the indirect *gyotaku* technique (Figure 35) and those contained in the publication 'Antarctic Fishes' perform a didactic role and exist as both works of art and as natural science illustrations. The majority of their *gyotaku* images are of the entire fish which is one of the most common forms of scientific illustration of fish which can be used for description and identification in 'systematic ichthyology'. However, all three of the *gyotaku* techniques have limitations and are not used to portray anatomic preparations, histological stains, larval fishes or specimens which need to be created larger than their actual size or specimens which can only be viewed under a microscope. Some fish such as flat fishes and rays can only be printed from above and below, it is impossible to print a side view. However, it should be noted that this is a common way of illustrating these fish in any medium. Every *gyotaku* image due to the nature of the printing process is of an individual specimen. Therefore, *gyotaku* is an ideal medium for the study of 'eidonomy'[9] if several fish of the same species are printed (McAllister, 1985).

The external appearance including the shape, size, structure, colour and pattern can easily be recorded using both the direct and indirect *gyotaku* techniques. However, conventional illustrators do not take one individual specimen as their prime example. Pedro Salgado an expert in the field of natural science illustration and a trained marine biologist describes some of the nuances involved in contemporary ichthyological illustration in the publication *Oceanário de Lisboa: Ilustração dos Oceanos*:

> "In a scientific illustration of a fish, we do not draw an individual. It is not a portrait but an alliance of scientific accuracy, visual expression, science and art. An image is created in which all the characteristics that identify a species are present, and a typical fish of that species is represented. It is not an individual portrait (shapes vary among individuals according to factors such as age)" (Oliveira, 2011, p.13).

9 Morphology the study of the form and structure of an organism and their specific structural features is divided into two distinct branches 'anatomy', the study of the internal features of an organism and 'eidonomy' the study of the form and structure of the external features of an organism.

Salgado is familiar with the *gyotaku* technique and he has on several occasions employed a well-known rubbing technique for creating botanical and fish images in his personal field study sketchbooks. These images were made by placing thin paper on top of the specimen and gently rubbing back and forth with a soft graphite pencil to generate a detailed image.

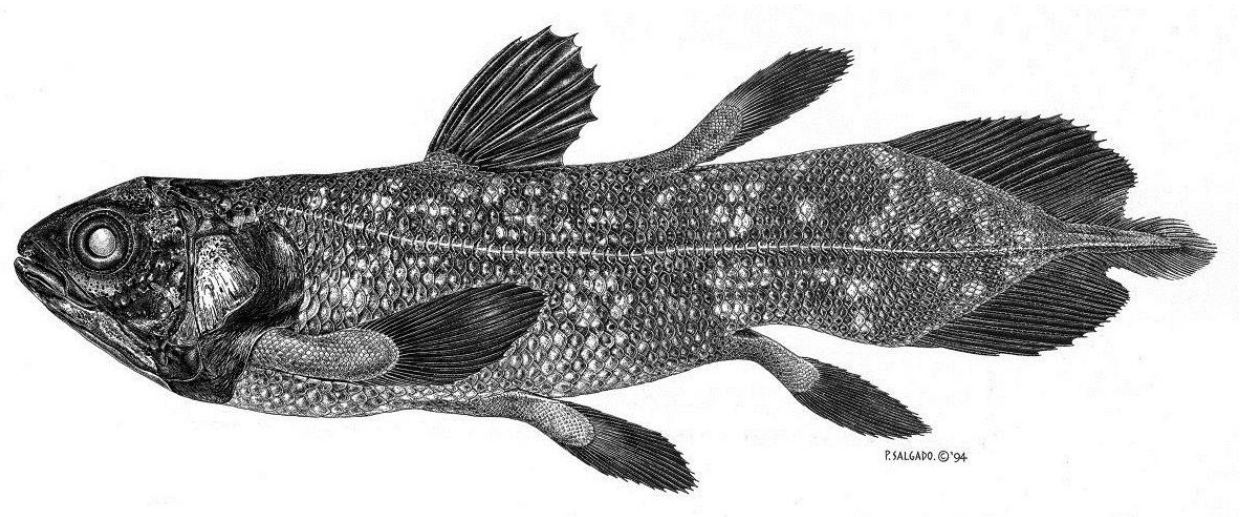

Figure 36 - An illustration of a Coelacanth produced in black Indian ink by Pedro Salgado. Awarded first prize in the 1994 World Congress on Biomedical Communications, USA. Image courtesy of Professor Mário Bismarck.

However, Salgado is perhaps better known for his labour intensive works in black ink and watercolour mediums. These images involve a vast amount of 'preliminary' work before a final finished image is produced. Recognising this Salgado has explained that when describing an illustration that took two hundred hours the first one hundred hours are devoted to the primary process of reading scientific papers, the observation of live, frozen or preserved specimens, taking photographs, creating colour samples (if a colour illustration is required), producing preliminary sketches. Once the scientists have checked that these sketches are correct only then is the final artwork developed. One example of Salgado's skill can be seen in his black and white illustration of

a Coelacanth[10] for which he was awarded the first prize in the 1994 World Congress on Biomedical Communications, USA (Figure 36).

The conventions of scientific illustration of fish such as illustrating the entire fish facing left and showing the left side view arose from a need to standardise images that depict the common external features used to describe the differences among fish species and for means of descriptions and classification. Exceptions to this convention are for example, flat fish and right eyed flat fish such as common sole, *Solea solea* (Linnaeus 1758) and solenette, *Buglossidium luteum* (Risso, 1810) and dorsoventrally compressed fish[11] such as, various cat fish, rays and some sharks and unusually shaped fish such as the small eyed guitar-fish, *Rhinobatus microphthalmus* (Teng 1959) (Helfman & Collette, 2011). Importantly, in direct *gyotaku* the printed image is a mirror image of the specimen. If the left side of the fishes body is printed the result will be an impression in which the head is facing towards the right. The indirect *gyotaku* technique results in a right reading printed image and the left side of a fish is printed with the head facing left.

James Maclaine a fish curator at the Natural History Museum in London contemplates the artistic, historic and scientific importance of the watercolour illustrations of fish contained in the Reeves collection and their value in the description and classification of fish. Reeves' fish were known in China and are illustrated in vast works such as *Bencao gangmu* by Li Shizhen produced in 1596. Shizhen's classification is based on appearance or utility and empirical observations and are mixed with poems, recipes, historical legends and medical prescriptions (Magee, 2009). Maclaine explains that:

10 Pedro Salgado's award winning illustration of a Coelacanth forms part of the 'Illustrating Fish' exhibition By Salgado and Cláudia Baeta at the National Museum of Natural History and Science in Lisbon, Portugal, from June 21- August 31, 2014.

11 Fish which are dorsoventrally compressed are flattened from top to bottom and have a wide, flat profile. Examples include angel sharks, crocodile fish, guitar fish, flat fish such as halibut, flounders and turbot and various types of rays.

> "Alongside the fish specimens that Reeves sent back to John Richardson he also sent some incredible illustrations. These pictures here show very accurately what the animals were like in life or shortly after death. So you can get an idea of the vivid colours that the fish would have when they were alive and a lot of these colourations and markings would have been lost or reduced when the fish were pickled" ("John Reeves collection", n.d. ¶4)

Of the five hundred watercolour illustrations of fish and numerous preserved specimens which were sent to Britain and examined by the eminent Victorian naturalist Sir John Richardson eighty of the preserved specimens were lost in transit. Richardson made numerous 'original descriptions' which are the first ever scientific description of a new species. The specimens used for original descriptions are called 'type specimens'. Furthermore Richardson described fish such as the catfish, *Melodious fulvidraco* in the absence of a 'type specimen' and only from the illustration, such illustrations become the 'type' and as they are an image rather than a specimen they are referred to as the 'iconotype'. The iconotype must be referred to by any scientist investigating the species which are based upon these illustrations. Reeves commissioned Chinese artists to work from start to finish on each illustration as opposed to 'stock paintings' in which a team of artists are each responsible for illustrating a certain part of a fish. Very few of the illustrations are signed and Akut, Akam, Akew and Asung are the only artists names recorded in Reeves notebooks (Magee, 2011). Evidently illustrations play an extremely important role in recording the discovery of new species, and the discovery of species which were thought to have become extinct or are perhaps currently on the verge of extinction.

An example of a fish which was thought to have been extinct is the coelacanth. Representatives of this group of creatures are found as fossils up until about seventy million years ago when they are presumed to have become extinct. However, in 1938 a living coelacanth was discovered and a second specimen was found in 1952. By 1988 approximately two hundred specimens had been discovered. In the article 'A fiftieth anniversary reflection on the living coelacanth, *Latimeria chalumnae:* some new interpretations of its natural history and conservation status' published in the journal 'Environmental Biology of Fishes' there is an image of a crudely

made sketch which is accompanied by a very short description of a fish like creature and beneath this the legend reads "The most important part of the letter Marjorie Courtenay-Latimer[12] wrote to J.L.B. Smith and which started it all" (Balon & Bruton & Fricke 1988, p.242). This illustration was sent in a letter to James Leonard Brierley Smith[13] who realised the fish was probably from a group which was thought to be extinct for the last seventy million years. The article features two *gyotaku* images of the coelacanth. The first *gyotaku* is from the Japanese Fishing School near Mutsamudu on Anjouan, Comoros Islands and following the typical sports fishing *gyotaku* the name of the fisherman, the location of the catch, the time and date, plus the length, weight and circumference of the body are all recorded. The print is signed in pencil at the bottom right hand corner "JICA EXPERT" with a Japanese name under this (too small to read clearly) and the date written in French, "12 Decembre" there is a red signature seal or official stamp to the right hand side of the date. Three days elapsed between capture of the fish and printing the coelacanth and various shades of green with yellow ochre coloured marks on the body were used. The second *gyotaku* print on the final page of the article is a black image which lacks information about origin, catch or print details (Balon et al., 1988).

One of the main problems with illustrating fish is that their aquatic habitat makes it difficult to see them and accurate visual images were not created until submersible machines enabled direct observation of the coelacanth in their natural habitat. Extant Coelacanth species, *Latimeria chalumnae* and *Latimeria menadoensis* are extremely rare they have a limited global distribution

12 In 1938 Marjorie Courtenay-Latimer (later Dr.) was only twenty two years old and working as a curator at the East London Museum in the Eastern Cape, South Africa. She was the first person to investigate and to try and preserve the specimen, despite lack of adequate refrigeration facilities. Hendrik Goosen a trawler skipper who made a habit of collecting specimens for the aquarium and museum in East London caught the fish and contacted Courtenay-Latimer when he arrived at the harbour with his catch

13 James Leonard Brierley Smith was then a Senior Lecturer in Chemistry and also a recognised ichthyologist at Rhodes University, Grahamstown and Honorary Curator of Fishes for the East London Museum, South Africa.

and are at a high risk of becoming extinct[14]. Brian J. Ford (1992, p.79) who has written extensively about science illustration and is aware of the important role that scientific illustration plays in our understanding of the world, expresses his concerns regarding the possible extinction of various species, "the pressure on nature lends an added urgency to the concept of archiving, for illustration through every means available - may be the only way we have to document life before it is lost."

An array of visual imaging techniques and technologies are available to the contemporary natural science illustrator and scientist. Images are becoming increasingly sophisticated with advances in technology. However it should equally be recognised that natural science illustrations are products of their time in which hidden influences and cultural pressures underlie the subjects which people choose to illustrate and the fashionable and technological constraints that are imposed on how they make their representations. Judith Magee[15] (2011, p.4) sums this up in a very apt opinion that.

> "Natural history art differs from other art genres in that it requires accuracy, realism and objectivity rather than emotion and sensitivity. Its main purpose is to help scientists identify and classify specimens" She explains further some of the main conventions of botanical and zoological drawings but claims, "That said, most natural history artists rarely, if ever, attain the complete authenticity sought by scientists and inevitably reveal something of themselves or of the age in which the work was produced."

14 In 1987 the 'Coelacanth Conservation Council' was established to encourage protection and population growth of the coelacanth and its natural habitat. The 'South African Coelacanth Conservation and Genome Resource Programme' was launched in 2000 to help further the conservation and research on the coelacanth. The IUCN (International Union for the Conservation of Nature) list both extant species of coelacanth as critically endangered. Both species are also listed on CITES in their Appendix 1 as critically endangered (Convention on International Trade in Endangered Species) of wild fauna and flora.

15 Judith Magee has managed the art collections of the Library of the Natural History Museum, London for over ten years. The Library holds one of the World's most comprehensive natural history collections. There are over half a million art works and over one million books.

3.5. Seeing and Knowing

The term 'seeing and knowing' is pertinent to illustrations of aquatic life suitable for natural history and scientific purposes. The goal of many illustrators working in this field is to create an objective and realistic visual representation. Nevertheless each sense informs the other and is equally influenced by the social and cultural context in which the work is produced. 'Seeing and knowing' are some of the main attributes of natural history/scientific illustrations and according to John Berger (1972, p.7):

> "It is seeing which establishes our place in the surrounding world; we explain that world with words, but words can never undo the fact that we are surrounded by it. The relation between what we see and what we know is never settled."

Particular problems concerning 'seeing and knowing' are encountered when working with aquatic life. Two of the major difficulties include:

1) the means to observe aquatic life, either when alive in its natural habitat, or when held in captivity in aquariums, also as dead specimens which have been preserved by various methods of pickling or taxidermy;

2) the means to capture and render the colours, markings, and the iridescent, and translucent qualities, of different aquatic specimens.

Illustrators and scientists often wish to observe creatures in their natural environment to document them and gain a better understanding of the creatures behaviour. This often involves the use of specially designed equipment and technologies, some of which are developed in collaboration with scientific research projects. New technologies for ocean exploration and underwater investigations have a direct impact upon the visual representation s of aquatic life. Not only the mediums available but also the style of visual representations are directly influenced by such technologies. One example concerns the giant squid *Architeuthis dux* (Steenstrup in Harting,

1866) and the difficulties encountered by scientists and illustrators with both viewing and capturing images of the creature which lives in the depths of the ocean. Since 2000 when Robert Kunzigs' book was published 'Mapping the Deep: the Extraordinary Story of Ocean Science' a variety of new marine and freshwater species have been discovered which were previously unknown to science. Furthermore, some species such as the giant squid, which was uncharacterised have now been scientifically observed and documented in their natural habitat with the aid of new technologies specifically designed for the purpose. Descriptions of mythical ocean beasts dating back to 1555 have since been posited to have been sightings of *Architeuthis*. Kunzig (2000, p.2) explains:

> "Giant squid are the world's largest invertebrate animals, as much as 60 feet long; we know that because from time to time their corpses wash ashore somewhere. But they have never been observed scientifically in their native habitat. In 1999 the Smithsonian Institution in Washington organized an expedition whose chief purpose was to find a giant squid in the waters off New Zealand, where fisherman have hauled up the odd *Architeuthis* in their nets. The researchers stayed out for a month with their television crew, diving daily in the submersible, reporting their observations of whales and other creatures on the expedition Web site but they never saw *Architeuthis*. May be by the time you read this someone will have. But maybe not. The ocean is a place where giant squid, and much else, can still hide."

In fact in January, 2013 reports of the first film of *Architeuthis* in its natural environment were broadcast globally[16]. The first ever photograph of a giant squid in the wild was reported in 2005. In an article in the 'Nature', the international weekly journal of science. Michael Hopkin describes how this occurred:

> "The photographs were taken by zoologist Tsunemi Kubodera of the National Science Museum, and Kyoichi Mori of the Ogasawa Whale Watching Association, both based in Tokyo. They used a 1,000-metre baited fishing line with a camera attached to record the close encounter in the deep" (Hopkin, 2005, n.p.).

Hopkin goes on to explain:

16 Video footage of the giant squid (*Architeuthis dux*) was filmed in its natural deep sea habitat during an expedition off Japan's Ogasawara archipelago. A six week mission was jointly funded by the Japan Broadcasting Commission (NHK) and the USA Discovery Channel. The squid was first seen using a specialised camera system called 'Medusa' which was suspended from the research vessel to a depth of approximately 700 meters. 'Medusa' was developed by Dr. Edith Widder, a Senior Scientist and founder of the Ocean Research and Conservation Association (ORCA) in Florida, USA. The giant squid was also seen from a Triton submersible by Dr. Tsunemi Kubodera of Japan's National Museum of Nature and Science and the pilot Jim Harris.

> "Captured near Chichijima Island in the North Pacific, the pictures come after years of frustrating, international quest to photograph the creatures. Previous attempts have involved remote-controlled observation submarines, and camera have been strapped to sperm whales, which are known to feed on giant squid" (Hopkin, 2005, n.p.).

Obviously *Architeuthis* are not only rare and difficult to locate and thus to observe, but also the hostile conditions of the deep sea require specialist apparatus and an experienced team of people to operate the equipment and to perform scientific research, in order to record and capture visual images.

However, some illustrators and artists have worked in collaboration with scientists and institutions to gain access to preserved specimens of giant squid. Unfortunately, the process of pickling[17] leads to a loss of colouration and markings. In some instances shrinkage can also occur. To avoid shrinkage when an illustration is being made the pickled specimen needs to be kept wet in its own preserving solution at all times. The lack of colouration, markings and possible shrinkage can present problems for both the illustrator and the scientist and unless a description or a visual record is made of the colourings, markings, measurements and other important characters that the creature had in life, it can be difficult to identify and classify specimens (Hodges, et al., 2003). None of these factors represented a problem for Master Mineo Ryuka Yamamoto and members of the International Fish Print Studio who were able to print a seven meter sixty centimetre preserved giant squid on July 29, 2008 (Figure 37). Doctor Tsunemi Kubodera who has observed, photographed, and filmed giant squid in their natural habitat was delighted to be able to assist with the printing. Kubodera and staff at the National Museum of Nature and Science in Tokyo were responsible for enabling access and helping with the preparation of the preserved specimens so that *gyotaku* printing could be carried out by the team. The squid remained intact and was unharmed by the indirect *gyotaku* technique which was used to print onto a roll of white polyester fabric.

17 Specimens are preserved using different chemical formulations depending on the nature of a specific specimen, the size, and purpose. Generally fish are preserved in a solution of seventy five to eighty percent ethyl alcohol to water.

Figure 37 - Indirect *gyotaku* of a giant squid at the National Museum of Nature and Science, Japan, 29 July 2008. Image courtesy of Mineo Ryuka Yamamoto.

Some pickled specimens are preserved using formalin or a formol-saline solution which are hazardous to health. Health and safety guidelines should always be followed when using any preserved wet specimens as formalin vapour causes respiratory problems and damages the lungs and mucous membranes. Gloves should be used as the chemicals can quickly turn the skin of the fingers hard and begin to preserve it. Despite some of the obvious disadvantages that pickled specimens present to the illustrator/artist the advantages are; that work can take place over several days if the specimen is properly handled and maintained including the fanning out and pinning of the fins and tail in certain fish; it is possible to gain access to an enormous variety of specimens which may not be observed by any other means; the lack of colour in the specimens is not so important if black and white images are required; and the specimens do not decay whilst in the process of being illustrated. As a testament to this there are several specimens in the 'Spirit Collection' at the Natural History Museum in London which date from the 1700's. Staff at the museum use various methods and chemical solutions to preserve and maintain the collections.

Today, collecting specimens is a collaborative activity and occurs only when there is a defined research need. It is considered unethical to collect certain animals from the wild such as primates and so strict legislation and the laws regulating bioprospecting are adhered to. In May 2004 the Natural History museum received a virtually complete frozen specimen of a female giant squid measuring eight meters sixty two centimetres in length[18]. The specimen was transferred to a freezer where samples of DNA were taken. The specimen remained frozen until the museum staff decided how best to proceed with the preserving process. Preservation began in February 2005 when the squid was defrosted over a period of three days. At this point various information and measurements were recorded. Injection of a ten percent formol-saline solution into the mantle prevented this large tissue mass from decaying and distorting. This was followed by immersion of the specimen into a tank of formol-saline for fixation and after nearly one month the "fixed" squid was transferred to the display tank. The artist Alice Shirley was so impressed when she saw the finished result during a tour of the museum's 'Spirit Collection' that she decided she had to draw it. In March 2010 Shirley completed a life size drawing of the 'squid in ink' on a roll of paper that measures nine meters by one and a half meters:

> "To draw the squid, Alice used fresh squid ink, which she says behaves a bit like the watercolour favoured by many great natural history artists. Despite having an apparently fishy smell, the ink is thick, viscous and water-soluble so can be manipulated like watercolours, even after it's dried." ("Squid in ink", n.d.)

Natural squid ink is used by some contemporary *gyotaku* artists (Figure 38) for creating direct *gyotaku* impressions of a variety of octopus, squid, and cuttlefish.

A different type of preserved squid was shown in the temporary exhibition 'Animal Inside Out' held at the Natural History Museum in London from the 6 April – 16 September 2012. Nearly

18 The giant squid was caught as part of a bottom trawl at a depth of 220 meters, 15.6 kilometres North West of Port Stephens Settlement, approximately 2 kilometres offshore by the Falkland Island registered trawler, 'John Cheek' on the 15 March 2004,. The Captain of the trawler donated the squid to the research station based on the Falkland Islands. The Falkland Islands Government then donated it to the Natural History Museum in London with the stipulation that it would be on public display.

one hundred examples of plastinate and capillary animals were shown including one *Architeuthis dux* (giant squid) which were produced at the Institute for Plastination. Gunter von Hagens invented the process in 1977 and is perhaps better known for his 'Body Works' exhibition in which the process is used on human specimens. Steve O'Shea an expert on squid at the Auckland University of Technology donated two giant squid specimens to von Hagens in 2004 and in 2010 one of the specimens, as previously agreed, was returned to O'Shea after the plastination process had been completed. Squid plastination presented particular challenges for the controversial anatomist due to their fragile skin and lack of internal support structure.

Figure 38 - Direct *gyotaku* of Common octopus, *Octopus vulgaris* printed in squid ink. Title *Polvo em Tinta*, canvas 150 x 150 cm with onion skin dye, mica pigment and acrylic paint, by Rachel Ramirez. Photo by the author.

O'Shea claims that "more scientists around the world are using plastination as a preservation technique, but it's not everybody's cup of tea" (Zuckerman, 2010, n.p.).

Today, some of the difficulties encountered with capturing the colours, markings, iridescent and translucent qualities of aquatic life have been largely overcome by the use of digital photography, and video, and a greater scientific understanding of the correct procedures for

working in aquatic habitats. Dr. Edith Widder realised early on in her research that many deep sea creatures would be frightened away by the traditional lights used in submersible equipment. Widder developed the 'Medusa' equipment which captured the first film of a giant squid in the wild. 'Medusa' imitates the natural visibility and bioluminescence present at ocean depths and so is unperceived by organisms that live in this habitat. Some species of squid are easier to see as they live in shallow waters and are commonly observed by snorkelling and scuba diving. Dr. James B. Wood (2001, n.p.) describes a communication study of Caribbean reef squid:

> "The rapid colour, shape and texture changes of these squid are amazing and it takes both still images, to capture the detail, and video, to capture the rate of change, to truly show what these animals are capable of. In 2001 we were filmed for 10 days for a Discovery Channel special. I can tell you that some really amazing underwater footage was captured and on the new HD format."

Various forms of digital photography and three dimensional computer modelling can provide anatomical and morphological information and images in a minimal-invasive and much faster fashion than traditional photographic methods. Although some of this new technology is relatively expensive the traditional methods of disseminating scientific information are limited to the types of information which can be presented due to the costs of publication. Many natural history illustrations are produced in black and white which reduces the costs although this is not always a suitable method as is revealed by the use of both stills and film images for the squid communication study. To fully understand a subject the need exists for a variety of visual representations. Such a range of images are included on the pages of CephBase, a dynamic html (dhtml) relational database-driven interactive web site that has been online since 1998.

> "CephBase offers researchers a new tool providing easy access to 1500 colour images, 144 video clips, over 5,000 references, and predator, prey, and location data for extant cephalopods. Comparisons between modern and extinct species are valuable: understanding the present is the key to understanding the past" (Wood, Bryne & Monks, 2003, p.265).

Despite the fact that there are no moving images, the website FishBase (www.fishbase.org) also contains a vast array of visual representations which are a valuable source of reference material for scientific researchers and illustrators/artists alike:

"There is an old saying that a picture is worth a thousand words. A compressed picture in FishBase requires about 40,000 bytes of storage space; one word requires about 8 bytes. In FishBase, a picture is thus worth about 5,000 words. Be that as it may, FishBase presently contains more than 26,000 pictures of fishes. These pictures consist of family pictograms, colour drawings of fish, scanned black-and-white (B/W) drawings, scanned colour photos or slides, drawings of fish larvae, drawings of fish eggs, rather repulsive representations of fish diseases, and, for philatelists, over 700 fish stamps for over 400 species" (Frose & Pauly, 2000, p.291).

3.6. The Illustrators Tool Box

The word 'illustration' comes from the Latin word *illustris* which means to elucidate and to illuminate. The aim of natural history and scientific illustration is to help to understand a text or gives a visual representation of what is written to facilitate interpretation of the text and thus illuminate the reader. If there is no text the illustration accurately depicts nature and may emphasise a particular detail. Today many scientists/researchers and illustrators initially record specimens using digital stills cameras and/or digital video due to the immediacy of the process, and the fact that the equipment is readily available, and that the images can be sent almost instantly, via the Internet, to fellow researchers across the world. Undoubtedly, photography and photomechanical processes have played an enormous role not only in the production and reproduction of images but they have also influenced how we perceive the world. However, finished illustrations can be produced using a wealth of modern and traditional mediums, and styles, including *gyotaku* which has become part of the illustrators 'tool box'. Lori Hatch[19] comments on her website (www.lorihatch.com/natureprints.html) "A well executed *Gyotaku* yields an image so accurate and detailed that it can become a useful tool for scientific study." Despite the fact that the three extant *gyotaku* techniques have some limitations (e.g. unsuitable mediums with which to portray internal organs or microscopic images) they also have a number of advantages and a unique aesthetic. For

19 Lori Hatch is an artist and member of the Nature Printing Society, who has printed on a government research vessel of the NOAA fleet. Hatch learnt *gyotaku* printing from master Yoshiko Takahashi and has been making *gyotaku* since 1977

example, *gyotaku* can reveal characteristics which may previously have been missed, and also give an exact copy of the features of a specimen. Professor Harvey Marchant writes in (personal communication, October 28, 2012) about master Boshu Nagases' indirect *gyotaku* prints which were specially made to illustrate the book 'Antarctic Fishes':

> "Clearly an image of the fish, or any other subject printed in this way, has to be anatomically accurately portrayed because the print is taken directly from the fish. So its size, the number of fin rays, the shape and size of the fins and tail and the position of the lateral line, scale, size, details of the gill covers etc. are an exact representation of the fish. The only artistic licence is in the colours used. Boshu Nagase used photographs of the fish taken immediately on capture and the advice of fisheries scientists to ensure that the colours used were accurate."

Master Boshu Nagase also ensures that each fish he prints is measured with callipers so that the dimensions of the finished work are accurate and the problems encountered when creating a two dimensional *gyotaku* impression from a three dimensional subject can be overcome. Nagase prints the top part of the fish first and then removes the paper and carefully repositions it in order to print the belly.

Today digital stills cameras and digital film equipment is routinely used by scientists and illustrators working with aquatic specimens. Steve Thurston a professional illustrator at the American Museum of Natural History and an avid angler and *gyotaku* artist explains in a (personal communication, December 11, 2012) that although current digital imaging techniques used by scientists such as scanning electron microscopes are able to effectively capture the surface morphology of specimens *gyotaku* impressions may be of value to science because "in the future, data could be harvested from the prints and be especially valuable if the population has gone extinct or declined considerably e.g. Morphometric analysis."

Early photography and a variety of photomechanical processes emerged in the nineteenth century and these techniques were used by both amateurs and professionals. In a similar fashion to scientific research, enthusiastic amateurs who created original and innovative images played an important role in the development of early photography and photomechanical processes.

Undoubtedly this was helped by the fact that the basic equipment for producing certain types of photographic images was not prohibitively expensive and could be afforded by some members of the general public. The first known photograph of a giant squid taken in 1874 (Figure 39) is attributed to members of the public, Messrs Parson and McKenna. Reverend Moses Harvey of Newfoundland, an amateur naturalist and writer is reported to have bought a dead giant squid for ten dollars from a fisherman who caught it accidentally:

> "Harvey immediately displayed it in his living room, draping the head and arms over a sponge bath for easy observation. It was the first complete giant squid ever put on display, and it became a turning point in our understanding of Giant Squid. Professor A. E. Verrill of Yale University used Harvey's "curiosity" to provide the first accurate description and scientific illustration of the Giant Squid." (Roper, 2013, n.p.)

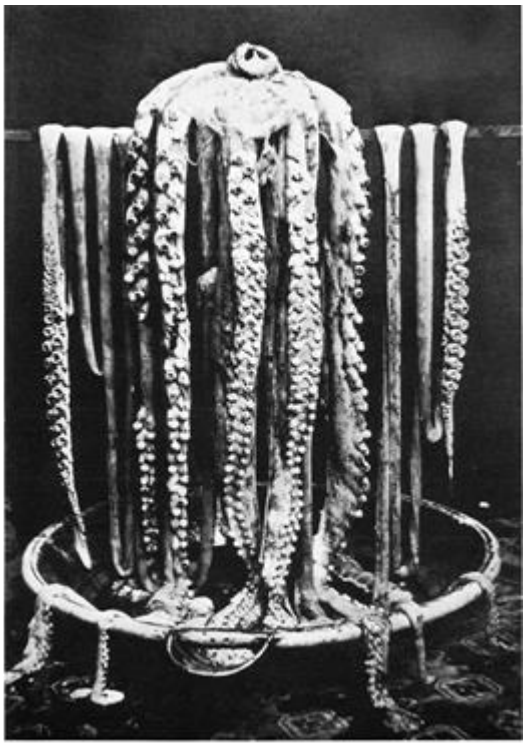

Figure 39 - The first photograph of a giant squid taken in 1874 by Messers Parson and McKenna. Image in the public domain.

Although the draping display may have enabled visitors to gain a better view of the giant squid this arrangement made it difficult to perceive the scale of the creature in the photographs.

Verrills' illustrations[20] is thought to have been made from both direct observation of Harveys' specimen and with reference to the 1874 photograph and is one of the earliest scientific illustrations to utilise a photograph for describing a species (Figure 40).

It was recognised very early in the development of photography that if it was to become a successful medium for illustration it needed to be converted into a printing plates which could be printed on a commercial scale. One of the earliest photographic processes, the cyanotype[21] as very popular with naturalists from the 1800's and is still in use today for creating 'nature prints'. Perhaps some of the most significant works of 'nature printing' were produced by Anna Atkins (1799-1871) from 1843 until 1854, who made cyanotypes of marine plants, British and foreign flowering plants, and ferns. The first instalment of 'Photographs of British Algae: Cyanotype Impressions' was self-published by Atkins in October 1843 (Figure 41). It is estimated that thirteen copies currently exist in various states of completeness, with the complete copy containing nearly four hundred and fifty cyanotype images with a handwritten text. Martin Kemp (2006. p.266) explains that "Her radiant plates exploiting the vivid blue tint of the cyanotype, comprise the first instance of any photographic process being utilized for systematic scientific recording on an extensive scale."

20 Professor Addison Emery Verrill (1839-1926) trained under the famous naturalist and geologist Louis Agassiz at Harvard University. At the age of 25 Verrill accepted the position as Yale University's first Professor of Zoology. In a career spanning more than 40 years teaching at Yale and serving as the curator of the Yale Peabody Museum Verrill published more than 350 papers and monographs. Verrill is credited with describing more than 1,000 species of animals with representatives from virtually every major taxon.

21 Cyanotype is one of the simpler photographic processes and is immediately identifiable by its Prussian blue tones. Sir John Herschel invented the cyanotype process in 1842. A solution of iron salts are used to coat paper which becomes light sensitive. This was then exposed to an object (as in the case of Atkins algae) or to a negative. The paper is then washed in water to fix the image.

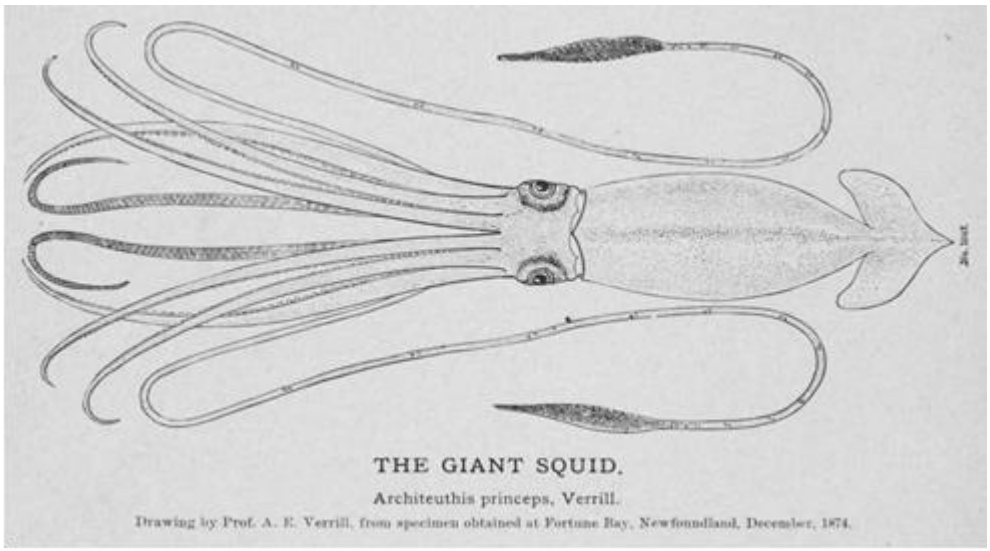

Figure 40 - The first scientific illustration of a giant squid drawn by Professor A. E. Verrill, in 1874. Image in the public domain.

Atkins publication demonstrates the labour intensive process involved in creating a cyanotype book, but it should also be recognised that cyanotype and Atkins work represents one of the first steps towards a photomechanical printing process, which became widely used by the end of the nineteenth century. One of the first non-camera, non-silver technologies used to create photographic images, the cyanotype was an inexpensive, simple and reasonably permanent medium. The term 'blueprint' has become part of our vocabulary as the process was adopted as a commercial copying technique for architectural and drawing-office plans. Although the cyanotype process did not become part of mainstream photography the process never became obsolete and is still used by a number of artists (Falconer & Hide, 2009). Contemporary artist Dan Peyton (b. 1958) uses a variety of alternative photography and non-camera techniques to create his works. One of Peyton's works titled 'Spring Tree' a unique cyanotype print was shown with one of Anna Atkins cyanotypes of a small fern, titled '*Trichomanes crinitum*' as part of the 'Propagating Eden: uses and techniques of nature printing in Botany and Art'. Curated by Pari Stave and Matthew Zucker the exhibition was held at the International Print Center New York (IPCNY) from March 6- April 19 2008 (Stave & Zucker, 2008). Peyton explains (2013, n.p.):

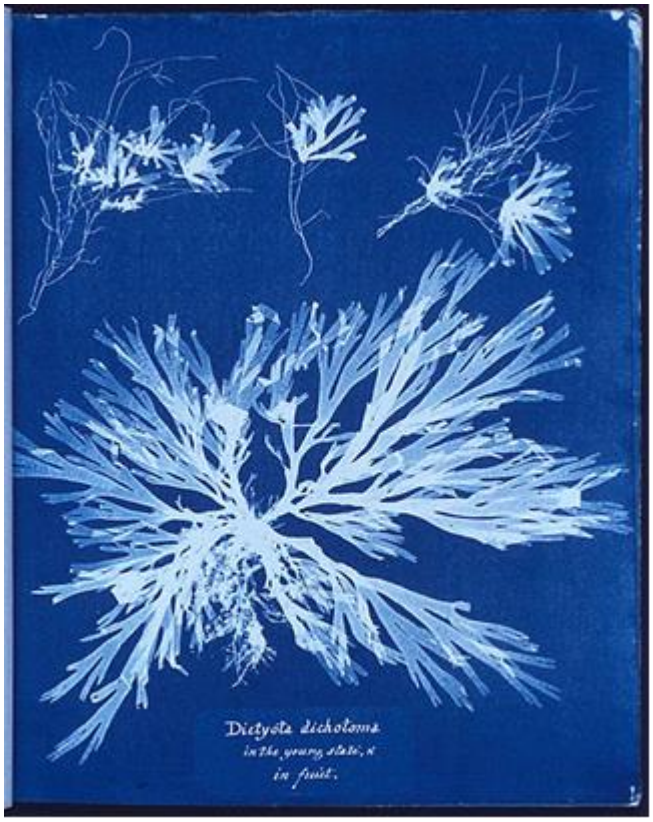

Figure 41 - A cyanotype by Anna Atkins from 'Photographs of British Algae'. Image courtesy of New York Public Library http:www.digitalgallery/nypl.org/nypdigital/id?419608

> "Early photography was a key part of creating the modern world by giving humans a reliable way of seeing a universal reality. Without this visual commonality humans were forever trying to describe how the world appeared to each other and never quite agreeing on the truth of the words, paintings and representations used. Photography changed all that. And yet photography still only represents the real world to us on its own terms. We are desperate to agree on this reality in order to feel a sense of control but I believe that in order to experience this commonality we ignore, perhaps to our peril, the limitations of visual understanding."

The production of early photographic images was of particular interest to the group *Shōhyaku-sha* whose members were seeking a reliable way of seeing and a means of producing visual representation of natural specimens without any evidence of the hand that made it. Ideally the image would be an objective one in which the viewer's acquisition of knowledge would be unaffected by the artists personality and inner self. It has been ascertained that members of the *Shōhyaku-sha* group had been studying ambrotype, calotype, albumen prints and other photographic techniques extensively, prior to Commodore Perry's arrival in Japan in 1853. In 1868 and 1869

Shunsan Yanagawa (1832-1870) a member of *Shōhyaku-sha* published the first book *Shashinkyō zusetsu,* 'Illustrated Book on Photography' which systematically describes the photographic process and was based on the writings of René Dagron and various European publications on photography. However, Maki Fukuoka (2012, p.107) notes that the methods for representing *shin* 'the real' were not limited to a particular technology or media:

> "Unlike other collectives studying *materia medica,* the *Shōhyaku-sha* assiduously produced literally dozens of manuscripts using a method of picture making called ink rubbing. In fact, the *Shōhyaku-sha* were distinguished from other collective groups pursuing *materia medica* in their continued use of this method of printmaking, known in Japanese as *inyō-zu-hō* (literally, "method of picture making through impressing leaves")."

It appears that numerous impressions of botanical subjects were produced by *Shōhyaku-sha*, using ink rubbing, copperplate etchings and wood block techniques. Photographic portraits were also produced by *Shōhyaku-sha.* Despite the similarities in the botanical ink rubbing methods to that of *gyotaku* there is no evidence of the group experimenting with printing different subject matter such as fish or other creatures. Perhaps this can be explained by the fact that the interest of *Shōhyaku-sha* members did not go beyond the study of *materia medica* and the generally held theory that *gyotaku* impressions were first made as a form of trophy, to record the fishermen's abundant or prize catch. The marine biologist and artists Akihiro Shiroza[22] explains in (personal communication, October 14, 2012) his thoughts about *gyotaku* and its relation to science:

> "I think *gyotaku* was popular in Japan as a way to keep a record of the big fish caught. In that way, it can be useful in fisheries stock assessment science because you get the historical maximum length of the fish that is useful in estimating the growth parameter such as maximum length. Fisheries affects growth parameter because we fish for large fish, and therefore the remaining population that spawns will be smaller fish. Now I think fisheries scientists already developed certain protocols on collecting growth data and photographing is common in keeping record so *gyotaku* is more of an art form."

22 Akihiro Shiroza is a larval fish taxonomist at the National Oceanic & Atmospheric Administrations (NOAA) at the Southeast Fisheries Science Center and founder of El Condor Art Studio in USA. Shirozas' work has been exhibited in the USA and France, including the IGFA, (International Game fish Association) Fishing Hall of Fame and Museum, where his series 'Glorification of the Dead' was shown. The artworks are a result of interacting on a quotidian basis with dead larval fish specimens as part of his work as a larval fish collector and taxonomist. The finished images are digital collages of multiple super-macro photographs of chemically treated and stained larval fish. Some images are magnified up to two hundred times to the size that a mature specimen would be.

An exemplary modern publication which contains images that could fall into a number of categories including art, scientific illustration and natural history illustrations is 'The Rockfishes of the Northeast Pacific' [23]. Rockfishes are a popular fish to print with *gyotaku* artists as they result in images with a detailed scale pattern and defined lateral line (Figure 42). Ninety artists and photographers are credited with the images included in the book. Amongst the rockfish images featured are; a photo of a tattoo, a bone carving, childhood snapshots of fishing trips, collages, pencil drawings, a photograph of a fossil rockfish, paintings on silk and canvas, fused glass, a photograph of a mid-nineteenth century human figure with a rockfish body from Alaska or British Columbia, key drawings including the different measuring points of a fish,drawings of frontal ridges and spines for identification purposes, a screen print created by the well known Portuguese illustrator Pedro Salgado, numerous paintings, drawings and a T-shirt designed by the American illustrator Ray Troll, plus a wealth of graphs, maps, diagrams, flow charts, microscopic imagery both photographic and drawn, tables, larval fishes illustrations and a range of illustrations of rockfish parasites, abnormalities and diseases, photographs from every angle of single rockfishes in their natural habitat and shoals of rockfish, photographs of freshly caught specimens and preserved pickled specimens, fishing nets and trawlers, satellite images showing sea surface temperatures, and internal and anatomical photographs.

23 The book 'The Rockfishes of the Northeast Pacific' by Milton S. Love , Mary Yoklavich and Lyman Thorsteinson addresses all aspects of rockfishes biology, ecology, fisheries management and current knowledge of this species of fish. Milton S. Love is an Associate research biologist at the marine Science Institute at the University of California and is the author of 'probably More Than You Want to Know About the Fishes of the Pacific Coast (1996), 'Fishes: a Field and Laboratory Manual on Their Structure, Identification, and Natural History (1986), and 'Readings in Ichthyology(1979) Mary Yoklavich leads the habitat Ecology Team of NOAA's National Marine fisheries Service Santa Cruz Laboratory and is an award-winning Research Biologist, well known for her research on west coast rockfishes, (USA). Lyman Thorsteinson is well known for his research on Arctic fishes and is Deputy Director of the U.S. Geological Surveys Western Fisheries Research Center in Seattle, USA.

Figure 42 - 'Quillback Rockfish' caught and printed in the direct *gyotaku* method by Sharron Huffman, 2011. Image courtesy of Sharron Huffman © 2011 www.sharronhuffman.com

In addition to this wide variety of visual images are nine *gyotaku* impressions which include;

- page VI a direct *gyotaku* of two rockfish printed in black on a watery blue and white background with black printed seaweed, by Sharon Huffman,
- page X an indirect *gyotaku* of two rockfish in full colour printed on fabric which has been dyed to resemble water, by Mineo Ryuka Yamamoto,
- page 112 a *gyotaku* impression in colour of the head and dorsal fin of a cowcod rockfish on a plain white background by Eric Hochberg,
- page 134 a coloured *gyotaku* of a redbanded rockfish with seaweed on a plain white background, by Sharon Huffman,
- page 203 a colour indirect *gyotaku* of a quillback rockfish with seaweed printed on silk by Sharon Huffman,
- page 221 a colour *gyotaku* of a China rockfish on a plain white background, by Chris Dewees,

- page 223 a colour *gyotaku* of a tiger rockfish on a plain white background, by Chris Dewees,
- page 313 a colour *gyotaku* on a pale coloured plain background of two Canary rockfish, by Bruce Koike,
- page 400 a colour *gyotaku* of a China rockfish featuring rocks and seaweed on a blended colour background, by Bruce Koike.

The rockfishes book demonstrates that in order to truly understand and identify a rockfish a range of visual images are required. *Gyotaku* impressions not only inform but also compliment the array of images contained in this book and regardless of whether they are described as works of art or illustrations they do indeed have a value to science and provide a means of visualization distinct from but complimentary to photographs and other recording approaches.

4. *Gyotaku* and its Relationship with Art

4.1. Introduction

This chapter is concerned with the progression of *gyotaku* from its beginnings as single colour trophy prints to the contemporary art form as it exists today. In order to comprehend the major changes and influences which have occurred throughout its history I analyse: technological developments in printmaking, cultural perspectives, environmental concerns, and topical ethical debates relating to the question, 'do fish feel pain?'.

Today *gyotaku* is considered an art and yet many fishermen across the world still create single colour direct *gyotaku* to document their catch or the prize winning fishes at fishing contest. These 'trophy prints' echo the style of the early Japanese *gyotaku* and include written information about the catch. A global resurgence in *tenkara* fishing has provided a means of introducing *gyotaku* to a wider audience. For example Dr. Hisao Ishigaki was invited to visit the UK based group 'Discover Tenkara' for five days in 2013, to give his overview of *tenkara* (a Japanese style of fly fishing) as it is practised in Japan. He brought with him some examples of his *gyotaku* prints which are works of art rather than trophy prints. During a break in the 'Discover Tenkara' groups fishing activities they were able to view Ishigaki's *gyotaku* and gain an insight into the techniques. He donated several *gyotaku* for an auction at the 'Wild Trout' charity[24]. The majority of fishermen who practise *gyotaku* declare that like the majority of *gyotaku* printmakers they wish to conserve nature and the environment. Many have stated that they view *gyotaku* as a homage to nature.

24 'Wild Trout' is a registered charity in the UK which is concerned with improving the habitat for the benefit of Wild trout and all wildlife in the river and on the river banks throughout the UK.

However, some people are opposed to this viewpoint and believe it contradicts the ethos of nature conservation, due to the fact that some *gyotaku's* are made from dead creatures. Therefore, I begin by examining the attitudes towards the use of fish and other aquatic specimens, dead or alive, as trophies and works of art, and speculate how these relate to the idea of a homage to nature.

I examine the different cultural perspectives of oriental and occidental visual arts and the ways in which these have contributed to a particular aesthetic style and choice of subject matter within *gyotaku*. I review printmaking techniques from the Japanese woodblock print to contemporary three dimensional printing speculating as to the impact of the Japanese industrial revolution with the introduction of lithography and the offset press which replaced the traditional woodblock printing of books and media. However, woodblock printing survived as an art technique and even after 1945 when Japanese printmakers were using screen printing and etching techniques, woodblock printing remained dominant. At this time *gyotaku* was not well-known outside of Japan and yet it quickly spread and the techniques evolved from a single fish to the brilliant multicoloured shoals of fish in underwater habitats, which exist today.

Admittedly the use of colour, perspective, and composition varies from Japanese to Western art and has been influenced by printmaking techniques and the introduction of photography. I use these differences to demonstrate the correlation of the development of *gyotaku* techniques with its spread from Japan. I discuss the introduction of new subject matter such as inanimate objects; bamboo fishing baskets, fishing nets and equipment, rocks, pebbles and plants from the natural habitat, and seasonal foods which make a good accompaniment to a particular fish. The use of colour and its significance as a means by which to record fish in a life-like manner, or artistically is also considered. I examine the cultural significance of the main colour groups as well as the use of metal foils, mica pigments and background colours and effects such as *Suminagashi* the traditional

Japanese art of marbling in which water based inks are floated on water and the results transferred onto paper by gently floating a sheet of paper on top.

Furthermore, I investigate the 'new directions' in *gyotaku* and consider works that extended the traditional subject matter such as Scott Szegeski's surfboard *gyotaku*. In addition, the adaptations of the *gyotaku* printing techniques such as those made by Olaf Altmann are also considered.

4.2. Homage to Nature

The artist Deborah Whitey who includes *gyotaku* as part of her artistic practice remarks:

> "Over time, the process of making fish impressions became an art form practised throughout the world- particularly in Hawaii, where the Pacific yields many majestic creatures of the deep. And like other traditional Asian art methods, it's rooted in a respect for nature and the natural form; homage to the fish if you will." (Withey, 2010, p. 6)

Indeed many *gyotaku* practitioners claim that they produce *gyotaku* as a 'homage to nature' or as a 'homage to the fishes' (or whatever specimen is used). Furthermore they claim to have a respect for nature and a concern for environmental and conservation issues. Some people have questioned these claims as they believe them to be unethical and contradictory to nature conservation and environmental issues. In agreement with the opinions held by many animal rights and animal welfare organisations the people who raise objections to *gyotaku* believe that the use of animals or animal parts, the killing of animals to create art, or the death of live creatures when they are used for the purpose of artworks for example, Damien Hirst's installation titled 'In and Out of Love'[25] is unacceptable and unnecessary since there is physical and psychological suffering of animals in order to create art (Baker, 2001).

25 'In and Out of Love' consists of two windowless rooms in which live butterflies of the tropical species Heliconius and Owl can fly around freely and have a supply of fruit, sugar water, and flowers to feed upon. The installation also contains butterfly pupae pinned onto white canvas.

The use of animals in art raises complex issues regarding the role of animals in human societies. A number of studies exist under the generic banner of 'animal studies', which closely examine aspects of the role of animals in human societies including the ethical and philosophical debates about the use of animals in art whether the animals in question are live creatures, roadkill, taxidermy, scientific specimens, pets or as they are sometimes called 'animal companions', or those which are purchased as a food source. However, it should be noted that despite the development of ink-less paper specifically designed for the use of *gyotaku* 'catch and release' printing as discussed in chapter seven, I have found no evidence of *gyotaku* practitioners using these materials or practising *gyotaku* printing on live aquatic creatures, or any information regarding the commercial availability of these products. *Gyotaku* practitioners favour the use of dead fishes or other dead specimens as they understand that even the relatively quick process of direct *gyotaku* would cause undue harm and distress to live fishes even if non-toxic, water based inks were used. On the rare occasions that live animals have been used these were pet dogs or pet horses, with the consent of the owners. The animals were made comfortable during printing and the indirect process was used to ensure the animals did not come into contact with inks, they were not harmed in any way by the process.

The British artist Nick Jeffrey (b. 1975) is well known for his work with butterflies, insects, and flowers. Recently fishes have been used as subject matter for producing a series of direct *gyotaku* prints, and x-ray photographs which can be viewed on his website (http.//www.njart.co.uk). Jeffrey states (personal communication, May 10, 2012): "The protection and conservation of the environment is a fundamental message in my work." He is actively engaged in various conservation projects in Kenya and in 2009 was the first person to initiate the export and import of sustainably farmed butterflies in Bolivia. Jeffrey's artworks with dried butterflies and insects are created within the framework of CITES (the Convention of International Trade of Endangered

Species) and with the help and guidance of the Canadian Wildlife Service. The farmed and reared specimens used in Jeffrey's artworks are neither rare nor endangered. Jeffrey has donated several of his art works for auctions to raise money for nature conservation charities such as the Pygmy Hippo Foundation[26].

In 2000 Jeffrey visited Japan and was fortunate to view a collection of woodblock prints and paintings housed in the Kompirasan shrine[27]. These included some screen paintings of butterflies on gold leaf made by Kishi Gantai [28]. Inspired by the items which he had seen in Japan, Jeffrey began creating his own art works making use of direct *gyotaku* for a series of fish prints and a gold leaf screen painting of a wisteria plant title 'Wisteria Under the Temple' which combines his signature use of dried butterflies on perspex rods, with painting techniques. Jeffrey's latest art work is concerned with the global decline in fish stocks for which he has plans for a large-scale project involving fishes, *gyotaku*, and working directly with North Sea fishermen in the UK.

It is not only artists who use *gyotaku* to express their concerns about conservation and environmental issues, but also those who work closely with nature. Staff at Coosa Riverkeepers in the state of Alabama, USA, commissioned the artist Richie Gudzan of 'Paddle Out'[29] to design a *gyotaku* T-shirt (Figure 43) as a means to pay homage to the Coosa spot and honour the river conservation work of the Coosa Riverkeepers. The T-shirt can be viewed at www.coosariver.org. Coosa spot is the local name given to a subspecies of spotted bass, *Micropterus henshalli* that is also called the Alabama bass:

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26 The Pygmy Hippo Foundation was launched in October 2012 with the primary aim of preserving the Pygmy Hippo and assisting critical habitat conservation starting with Eastern Liberia's remianing tracts of rainforest, and the development of of Liberia's Sapo National Park in South East Liberia.

27 Kompirasan formally known as Kotohiragu is the main shrine of multiple Kompira shirines found in Japan located on Mount Zozu in Kotohira, which are dedicated to sailors and seafaring.

28 Kishi Gantai (1782 – 1862) was a Japanese painter and son of the famous Kishi Ganku (1749 or 1756 – 1839). He became the leader of the Kishi School of painting with his brother-in-law, Kishi Renzan after his father's death.

29 The 'Paddle Out' brand formed in 2011 by Gudzan has a range of sportswear featuring *gyotaku*.

> "Anglers, game and fish agencies, and biologists have long recognized the distinctiveness of the Alabama bass, although a thorough systematic analysis of this form was lacking. The form was first diagnosed as a subspecies of the Spotted Bass, *Micropterus punctulatus*, by Hubbs and Bailey (1940), who recognized it as having smaller scales and a more elongate body." (Baker, Folkerts & Johnston, 2008, p.57)

The sale of the T-shirts is aimed at raising awareness of the Coosa River spotted bass, and the research, advocacy and outreach work performed by Coosa Riverkeeper conservation project. The artist Richie Gudzan went fishing with Frank Chitwood a Riverkeeper below the Jordan Dam on the Coosa River in order to catch a Coosa River spotted bass. Once the fish had been caught and humanely killed Gudzan prepared it for printing. He used black oil based block printing ink and handmade Mulberry paper with small inclusions and the direct *gyotaku* technique to create the basis of the T-shirt image. Once the impression was dry it was painted with coloured paint and digitally manipulated in order to produce positives ready for screen printing the T-shirts.

Figure 43 - T-shirt designed by Richie Gudzan of Paddle Out using a *gyotaku* of a Coosa River Spotted Bass. Image courtesy of www.coosriver.org © Richie Gudzan

Although killing fishes represents the commonest form of human interaction with them, and despite the environmental impact and growth in the global demand for fish as a food source, and to

a lesser extent the aquarium trade, the public often voice objections when live fishes are used in works of art. In 2009 the Tate Modern Art Gallery in London faced accusations of neglect:

> "A total of 55 fish were kept in three tanks as part of an installation by Cildo Meireles, a prominent Brazilian artist, but almost a quarter of them died during the 13 week long exhibition. The fish were Ghost Catfish and Chanda Ranga. Commonly known as Glass fish- and were used in two art works, entitled *Atraves* or *Through* and *Red Shift*." (Nikkhah & Henry, 2009, n.p.)

In fact these fishes were sourced by Meirele's (b. 1948) from a reputable aquarium specialist who advised on the appropriate conditions to ensure the welfare of the fish, which were maintained by the Tate, in London, throughout the exhibition.

In 2003 the Chilean artist Marco Evaristti (b. 1963) caused public outrage in his work entitled 'Helena' which was exhibited at the Trapholt Art Museum in Denmark. The work featured ten functional food blenders containing goldfish and the visitors to the exhibition were invited to switch the blenders on. Because several of the goldfish were liquidised the Museum Director Peter Myers was charged with animal cruelty but was later acquitted (Anon., 2003).

One of the most well-known British artists, Damien Hirst (b. 1965), has also caused public outrage and has been condemned for some of his works which include dead fishes, animals and insects and live butterflies. Hirst's series 'Natural History' features various animals preserved in formalin or formaldehyde and displayed in cabinets and vitrines. The series includes his iconic shark titled 'The Physical Impossibility of Death in the Mind of Someone Living' created in 1991. This piece consisted of a 4.30 m tiger shark, *Galeocerdo cuvier* preserved in formaldehyde and displayed in a glass and steel vitrine which was later recreated in 2006 with the assistance of Oliver Crimmen a scientist and fish curator at London's Natural History Museum. The original vitrine was used in the 2006 version:

> "The shark tank – three cubes bolted together- was built by the company that made the aquaria for Brighton's 'Sea World'. The preservation of animals in zoos and aquaria is a vexed issue – what does their captivity acheive? The sculpture acts as a gateway to the moral maze of conservation. The great white shark, which Hirst planned to use, was declared a protected species three days before he placed his order in Australia. The extraordinary tension of the piece comes from its neutrality; from raising

issues, yet refusing argument. The work offers drama without catharsis, confrontation without resolution, and provocation without redress. Responsibility is returned to the viewer" (Kent, 1994, p.37).

The Australian art critic Robert Hughes dismissed Hirst's pickled Shark as "the world's most over-rated marine organism" (Chang, 2008). Yet the works by less well-known artists which include dead animals do not raise such negative media attention. For example, Jorge Peris (b. 1969), a Spanish artist perhaps better known for his installations, has created a series of smaller works using dead octopuses (Figure 44) and chicken skins.

Figure 44 - Dead Octopus on paper by Jorge Peris titled 'Pulpo Jones', 2011. Image courtesy of www.artbarter.co.uk © Jorge Peris.

A short article about *gyotaku* and the *gyotaku* artist Mineo Yamamoto written by Robert Genn on the 9 October (2001, n.p.) which prompted a number of positive and negative comments. Beverly Willis suggested that although she was "Not saying anything against this person, but his ways of getting a painting seem a bit barbaric."And from John Evans, "Poor fish... if Mineo is so amazing why doesn't he paint the fish from memory and not kill it..... just another gimmick... and I certainly hope he doesn't kill the whale." Robert Genn stated that:

"Several artists wrote and suggested we alert Greenpeace. Also if the print of the whale could be made

from life and then somehow release and set free this noble and endangered animal" (2001, n.p.).

From reading the various comments on Genn's website it is clear that people were ill informed. The whale in question was a small juvenile which had died in captivity and had been preserved for scientific study. Yamamoto had no intention of killing a whale. With regards to the fish he uses for *gyotaku* Yamamoto practises 'catch and release' fishing and eats any edible specimens at the end of a printing session or freezes them so that they can be used repeatedly. Ellen Borsman suggested on the same website an environmentally friendly alternative to using a genuine fish:

> "You can learn about fish anatomy while practising the Japanese art of *Gyotaku* by using rubber fish. Rubber replicas are available (cast directly from real fishes). You also need several items like newspapers, cardboard, paper towels, inks or tempera paints, a brush or roller and paper or fabric for printing. You simply roll paint or ink over the fish and mat with paper. You can clean up with soap and water. Use multiple paint colors for added effects. Rubber fish replicas do not wear out, nor do they have any odours like real fish do. It's a cleaner and more environmentally sound alternative to using real fish" (Genn, 2001, n.p.).

Although the use of silicone or rubber specimens is an alternative many *gyotaku* artists make use of these and also recognise that the replicas have their limitations. One disadvantage of using replicas is the distinct lack of variation as each impression taken from a particular replica will always appear similar as its details, layout or shape of the body and fin and tail positions, and the overall size do not vary as occurs with natural specimens. The only variations that can be made successfully are through the use of different colours for printing, the use of different substrates to print on, plus the composition.

Fishes and other aquatic creatures have proved to be an important subject matter which features in art works of many prehistoric and ancient cultures across the world:

> "The earliest pictures of fish were painted onto the walls of caves by Palaeolithic man but not in sufficient details for us to be able to define their species. A fish on the walls of a cave at La Pileta, Malaga, Spain is thought to have been painted 25,000 years ago" (Jackson, 2012, p.22).

Ancient Egyptian images of fishes found on the walls of tombs can be easily identified as species from the Nile River and the common carp, *Cyprinus carpio*, is also easily recognisable in

ancient Chinese art works. The use of fish or other aquatic creatures as found in art not only stems from their importance as a source of food and as cultural icons, such as the salted cod, *Bacalhau* of Portugal (Garrido, 2011), and as symbols in myths, and folklore traditions for example sea turtle's and their significance to Fijian islanders (Figure 45), and as symbols represented in spiritual and religious belief systems (Witherington, 2006).

Figure 45 - A World Wildlife Fund poster for the conservation of Sea Turtles (www.worldwildlife.org/species/sea). Image courtesy of WWF SPf ©

The ethos of many *gyotaku* impressions is to create a visual 'homage to nature' even though a fish or other aquatic creature is taken from 'nature' and killed in order to do so. To many people this apparent lack of harmony with nature (i.e. killing) is to some extent exhibited in the stereotypical view that is often expressed about the Japanese who are claimed to have a particular affinity for nature, which is reflected in their art and material culture:

> "The commonly held view that the Japanese have a 'love of nature' has been developed and repeated literally for centuries by both the Japanese and observers of Japan. Closely related to this notion of love is the equally widely-held notion that the Japanese live in harmony with nature, which is

> frequently contrasted with the quest to 'conquer nature' allegedly found among Westerners" (Asquith & Kalland, 2004, pp.1-2).

These notions may have developed from Japanese spiritual and religious beliefs, particularly Shintō in which the *kami* (divinity) is believed to reside in nature, thus making nature and the spiritual world inseparable. The influence and relationship between *kami,* nature, and man is also evident in various forms of Japanese Buddhism.

Debates over the Japanese affinity for nature tend to dominate discussions of the fine and applied arts. But these debates obscure the important issues of environmental and wildlife conservation in Japan. For example, a recent environmental performance review of Japan made by the OCED (Organisation for Economic Co-operation and Development) (OECD 2002, p.136) claims that "Biodiversity in *lakes, ponds, swamps and rivers,* with their populations of aquatic plants fish and birds, has suffered in particular from changes in water management and pollution." Also, by the late 1990s, only 12 of 113 rivers under review were free of river crossing structures or had facilities permitting sufficient fish passage. Moreover:

> "by 1997 Japan had replanted 43 percent of all its woodland with monoculture of coniferous tress, mostly *sugi,* or Japanese cedar. In the process Japan's rural landscape has been completely transformed" (Kerr, A. 2001, p.53).

Perhaps one of the most controversial issues is Japan's practise of 'scientific whaling'. The International Fund for Animal Welfare (IFAW) declares:

> "Despite the global ban of commercial whaling, Japan uses the provision in the 1946 whaling convention which allows whales to be killed for scientific purposes. The 'scientific whaling' provision has also been used by Norway and Iceland as a way of getting around the rules. However, little, if any useful information comes from 'scientific whaling' and it is quite simply commercial whaling conducted under the guise of science. It is hard to imagine any other scientific investigation of a species being organised around the principle of mass killing" ("The truth about", n.d.).

Today, *gyotaku* impressions produced in Japan or the West not only represent an alternative to taxidermy, fishes being notoriously difficult specimens to mount and preserve, but also enable the fisherman to create an inexpensive printed trophy and to eat any edible specimens. *Gyotaku* are frequently used to raise the public's awareness of environmental and conservation issues. The

techniques have developed into an art form from the late 1940's onwards and *gyotaku* works are frequently exhibited in art galleries and exhibitions across the world and, as discussed in chapter five, the techniques have been adopted by a number of famous artists. *Gyotaku* techniques are rooted in a respect for nature and as Lyle Brunson[30] states *gyotaku* "gives homage to the other side of the world where this type of printing comes from" (Figure 46) (Graham, 2013, n.p.).

Figure 46 - Business card of Lyle Brunson © fishprintbaja@gmail.com Image courtesy of Lyle Brunson Google Share.

4.3. The Craft and Fine Art of Printmaking

Because various printmaking techniques and mediums facilitate the exact reproduction of an image or a three dimensional object, as in the case of 3-D printing, this implies: the editioning of prints, publication, distribution, display, and collecting of prints. However, the editioning of prints is not a fundamental part of printmaking but merely a by-product of various printmaking processes because mono types (or mono prints) and variable editions are equally recognised and accepted as fine art printmaking. *Gyotaku* is often placed in the same category as mono prints even though the techniques and materials differ. This is due to the assumption that all three *gyotaku* techniques are only suitable for creating unique prints. However, skilled printmakers are able to utilise *gyotaku* to

30 Lyle Brunson is a professional sailor who has travelled for more than forty years visiting and fishing locations across the world. He currently resides in the East Cape, in Baja Sur, Mexico where he practises *gyotaku* and provides a fish printing service for sports fishermen.

create 'variable editions' in which the small differences in each print of the edition are barely noticeable, as discussed in chapter five, regarding Steve Thurston's prints. By combining direct *gyotaku* with woodblock prints Thurston creates small numbers (for example seven) of variable edition prints which he numbers, titles, and signs in pencil in the typical manner of signing prints and adds his personal seal in red ink. Tim Mara[31] proclaimed in the 1980's:

> "The practice of printmaking is active, it's alive and it's fresh. It has survived the gloomy markets of the 1970s, the influence of mass media, photography, new technology and much else to emerge strong; a separate activity from painting and sculpture, photography and video but with which it has obvious relationships" (Turner, 1989, p.7).

And this statement still holds true today. In fact, new printing technologies such as *giclee* and 3-D printing have not usurped the more traditional printmaking processes but have been embraced by artists as another means of expression and they are accessible processes.

Giclee has become the preferred printing process for those *gyotaku* printmakers who produce either signed limited editions or open editions of their original *gyotaku* images. Not only is the *giclee* printing process faster and less expensive than other forms of printing it also creates less waste and is suitable for producing small editions. One of the added advantages of *giclee* printing is that it is not necessary to print the entire edition of prints at one time as in lithography and other traditional printing processes. Digital files are kept, which record the necessary information relating to each print and the artist can request a single print or a number of prints as required.

Research has led to the use of 3-D printing in diverse industries such as aerospace, architecture and construction, biotechnology, dental and medical industries, engineering, fashion and footwear, industrial design, military and weapons manufacture. 3-D printing has also been used by a number of artists whose work challenges the definitions of what printmaking actually is. Linlin

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31 Tim Mara (1948-1997) was an artist renowned for his use of screen printing, etching, and lithography. For 25 years Mara taught at a number of Art Colleges and Universities including; NCAD (National College of Art & Design), Dublin, Chelsea School of Art, London, later becoming the Head of Printmaking at the Royal College of Art, London.

and Pierre-Yves Jacques are two artists who have been using 3-D printing in their work since 2009 (Figure 47). Many of their artworks are inspired by nature and their series titled 'Animal Lace' makes references to both the traditional taxidermy hunting trophies in which the head of an animal is stuffed and mounted for display on a wall, and the intricate lace images which were printed using 'nature printing' techniques in the nineteenth century:

> "The printing section of the Great Exhibition of 1851 included an extensive display of 'specimens by which the effect of various fabrics were successfully imitated' reported the *Journal of Design.* In its final issue (September 1851 to February 1852) the *Journal* showed specimens of lace printed by William Taylor of Nottingham by a process he had developed himself." (Cave, 2010, p.89).

The city of Nottingham in England, was the world centre for lace production in the nineteenth century. It was during this time that an explosion of 'nature printing' techniques were developed across Europe.

Figure 47 - 3-D printed wall sculpture by Linlin and Pierre-Yves Jacques. Title: 'Deer' part of the 'Animal Lace' series. Dimensions: 40.6 x 29.1 X 25.1 cm. Image courtesy of www.lpjacques.com

It has yet to be seen if *gyotaku* printmakers will make use of 3-D printing technologies to create fishes and other specimens suitable for *gyotaku* printing techniques. These technologies offer

a means of printing unique specimens which vary in size and appearance just as genuine specimens do in nature, without the need to kill a living creature. 3-D printing could also provide examples of specimens which are not normally available in a particular area, as well as rare, protected, and endangered species, which printmakers would otherwise not have access to.

Another method for creating trophies of fishes, which unlike *gyotaku* and traditional taxidermy fish mounts does not require the fish to be killed, is offered by the company 'Customfish.com', based in the USA. Jamie Riani explains (personal communication, November 16, 2013) that a life size trophy print is:

> "the alternative to a mount, especially for fishermen who practice CPR (Catch, Photo, Release). With today's technology and the advancements of digital and film photography, many of you are capturing your moment of glory with a click of a button."

Moreover, once the 35 mm film, digital image, or photograph, has been supplied by the fisherman with the actual length of the fish from head to tail. If the measurement of the fish is not known Customfish have developed a process for accurately calculating this from the image, this also ensures the fishermen are not exaggerating the size of their catch. Customfish may enhance the image using Photoshop. For example, hands which are holding the fish can be erased. Once the image is corrected Customfish can create a life size digital print, using UV coloured inks on a durable vinyl fabric. To complete the fish trophy the digital print is carefully stretched over a Styrofoam form, ensuring there are no wrinkles or distortion of the image and this can then be wall mounted. Customfish were responsible for printing the world record blue catfish, *Ictalurus furcats*, caught by Tim Pruitt in May 2005:

> "Lt. Gov. Pat Quinn displayed a life-size photo of the world's largest blue catfish in the Capitol Press Room and discussed fishing hotspots with Tim Pruitt of Fosterberg who landed the fish on the Illinois side of the Mississippi River near Alton on May 21st. The 124 pound-fish fought for 40 minutes and dragged Pruitts boat containing Pruitt, his wife and a friend for three miles downstream" (Illinois Gov. News Network, 2005, n.p.).

The photo referred to in this press release was actually a digital print made by Customfish. It is also interesting to note that Governor Quinn stated on the Illinois government website that:

> "Sport fishing in Illinois is an important form of nature-based tourism. Illinois sells fishing licenses to more than 1.2 million anglers who spend more than 16 million days fishing in our state, and many of those individuals come from the world over to enjoy our great outdoors" (Illinois Gov. News Network, 2005, n. p.).

Strictly a 'catch and release' angler Pruitt decided to make an exception to his rule with the blue catfish and it was placed in a holding tank. This allowed biologists to observe the fish and to confirm that the fish was in good health after being caught. The decision was made to transport the blue catfish to a large aquarium in Kansas city, Kansas, USA. Unfortunately, this record breaking blue catfish died in transit, something which greatly distressed the conservation minded Pruitt. He explained on his website (www.timpruitt.net) that if he had any idea of what was to become of the catfish he would not have donated the fish. An unnamed biologist reported on Pruitts website that because the fish was very old and very heavy, the travel stress could have been too much. Although, Pruitt was distressed by the death of the blue catfish he continues to go fishing and practises 'catch and release'. Currently, Pruitt is working with a number of scientists to collect data about the blue catfish which is one of North Americas largest growing catfish.

Similar to Pruitt, Fred B. Mullet is also concerned with nature conservation. He developed his rubber stamp company, 'Fred B. Mullet Group' from his interest in nature printing:

> "After becoming enchanted by the art of nature printing especially *Gyotaku*, Fred started his first rubber stamp company ("Fred B. Mullet, Stamps From Nature Prints") in 1993. It was intended as a part- time endeavour while attending the University of Washington / School of Fine Art for his second degree. In 1997 all other employment, recreational and educational activities were put on hold in order to concentrate on the business" (Larsen, 2011, p.55).

The growing popularity and reputation of rubber stamping as an art form, particularly in America has led to numerous publications which include Mullet's techniques and the use of his rubber stamps from nature prints. Mullet regularly teaches classes in rubber stamping techniques and his stamps can be purchased directly on his website or at numerous retail outlets across the USA and Canada. Mullett produces a range of vulcanised rubber stamps using his own *gyotaku* and nature prints as the original art work. The original art work is used to produce a negative image

which is suitable for making a metal master plate. A sheet of rubber is placed on top of the metal plate with a sheet of wax paper, to enable its release, in a vulcanising machine. Heat and pressure are applied by the machine and the result is a sheet of rubber with a relief image. Each individual image is cut out from the sheet by hand and any excess rubber is removed. The stamp can be mounted on to wooden bases or transparent acrylic. Mullet (2011, n. p.) clarifies that:

> "The images for this company come from making relief prints of objects found in Nature; fish, shells, plants, feathers, etc. *Gyotaku* is the Japanese name for "fish rubbing" an honoured art form over 150 years old. As to other styles of nature printing, there are as many forms as there are practitioners."

Rubber stamping fishes and other specimens from nature is an eco-friendly printing process in the sense that the specimen only needs to be printed once to create the original art work. The metal plate can be used thousands of times to create the rubber stamps and when the metal plate becomes worn or damaged in any way a new plate can be made from the original art work. The art of rubber stamping is a versatile process which enables various substrates such as paper, fabric, clay, glass, metal, plastics, and wood to be used with a wide range of inks including metallic effects, pearlescent inks, glitter inks, and textured inks and printable glues which can be sprinkled with special powders to create a flocked or raised effect. Mullett has developed different techniques for using the stamps such as spritzing (Figure 48) Water based markers or watercolour paints are applied onto the surface of the rubber stamp and a fine mist of water is sprayed on top. The stamp is gently pressed on to paper and the results have the appearance of watercolour paintings. Shoals of fish can be created from one rubber stamp, which have the appearance of depth and movement.

Figure 48 - Artwork by Fred B. Mullett created by using one rubber stamp, watercolour medium, and his spritzing technique. Image courtesy of www.fredmullett.com

Another rubber stamping technique which Mullett has developed into an art form is the use of bleach for rubber stamping (Figure 49). Generally black or dark coloured papers and fabrics are used as the substrate and bleach in gel form is applied to the rubber stamp. Once the colour from the substrate has been extracted additional pigments can be added.

Figure 49 - Fred Mullet's rubber stamp print of a bass, created using the bleaching technique. Image courtesy of www.fredmullett.com

Digital printing techniques, *giclee,* 3-D printing, and rubber stamping are all relatively eco-friendly, inexpensive and accessible printing processes which have been used as a tool for creative expression by artists whose work is concerned with nature. Woodblock printing is intrinsically linked with Japanese culture and is perhaps one of the country's best known art forms. Although

printing as a means of reproduction was used in Japan as early as the eighth century it only emerged as an art form during the second half of the seventeenth century. Japanese artists have made use of this printing process to capture both realistic and creative renderings of nature. Despite the fact that the process is eco-friendly, inexpensive, and does not require a printing press, it is suitable for creating editions of prints and obviously the printed results are very different in appearance to prints produced using any of the three *gyotaku* techniques. However, because of the history and dissemination of woodblock prints in Japan and the West the aesthetic style of these prints has affected the artistic practice of *gyotaku*.

The Japanese woodblock process is briefly outlined here (Smith, 1985);

- First an artist creates a design or drawing.
- Then a copy of this is drawn in black and white on paper and the areas of colour (if any) are noted and also any embossed areas.
- This drawing is given to a carver who transfers this drawing on to the 'key block' which gives the major outline of the print and to which all subsequent blocks will be registered and cut to. In the *kentō* system for registration, these marks are cut into the key block last.
- Normally each colour is printed on one block. It is only possible for two or more colours to be printed per block if they are positioned far enough apart.
- When the blocks have been carved the printer applies water based colours and takes a print by placing a sheet of paper in registration on top of the carved woodblock and prints by hand with a baren:

> "The colours used for traditional Japanese woodblock are always water-based, of varying degrees of permanence and are divided into two groups: inorganic (mineral) and organic (vegetable). They are generally mixed on the block with rice paste (*nori*) which acts as a medium. The four basic colours of Edo woodblock were black (*sumi*), yellow, blue and red. Other colours were achieved by overprinting. It can be very hard to discern the original colour palette used in prints as over the years colours have faded and the paper has often yellowed. The first change in this palette came with the introduction of

Prussian blue followed by the import of harsh aniline colours from the West in the Meiji period (1866-1912)" (Salter, 2001, p.26).

The earliest extant *gyotaku* prints were not considered to be works of art, merely records of fishing trips or fishing trophies which could bring good luck. It was not until the 1940's that *gyotaku* began to evolve into the art form as it exists today.

4.4. Colour and Meaning

Colour is seen and manufactured in our brain. In a literal sense colour does not actually exist, it is created according to our genes and past experiences. Light exists and wavelengths of light can be measured and counted. What humans sense as colour is the reflection and absorption of impartial light waves as they meet objects and the environment. Yet our perception and experience of colour is difficult to describe objectively and varies from culture to culture. A wealth of studies exist concerning colour and perception-based evolution which indicate that one of our simplest perceptions, that of colour, has shaped who we are and has proved to be a central element of human culture (Livingstone, 2008).

Colours are described with language which is of course problematic because many languages contain words which express colours and non-colour properties, for example the word 'green' in English expresses both a colour and in terms of a non-colour property it means to be immature or unripe. "Different languages vary in both the number of basic colour distinctions they make (ranging anywhere from two to over twenty) and in the ways they draw those distinctions on the spectrum" (Dye, 2011, n. p.). Examples of these colour distinction are clearly evident in the cultural perceptions made between green and blue for native Japanese speakers. The late Dr. Francis Conlan, an Australian linguist, verifies that:

" The Japanese language has a colour term 'ao' (or 'aoi'), which is usually referred to in bilingual dictionaries as being the equivalent of English 'blue'. Very often, however, it is used to describe things which English speakers would describe as being green. Granny Smith apples are 'ao', so are all Westerners' eyes regardless of whether they would be described as being 'blue' or 'green' in English.

> The sky and the sea are prototypically 'ao', but this term is also used to describe, lawns, forests, traffic lights and unripe tomatoes" (Conlan, 2005, p.2).

A common explanation for this phenomena is that the colour term *ao* is a descendant of the original Japanese 'grue' category, as it is called in colour nomenclature research, which does not differentiate between blue and green. *Ao,* (blue / green) *aka,* (red) *kuro* (black) and *shiro* (white) are the four oldest colour terms in the Japanese language, originating in the eighth century. In modern Japanese language these four ancient colour terms are the only ones which are prefixed by the word *ma,* meaning 'perfectly' or 'true'. The colour bright red is *makka,* pitch black is *makkuro,* sky blue is *massao* and pure white is *masshiro* (Hibi & Fukuda 2000). Evidently, the differences and subtleties of colour perception can be lost in translation and the Western names for these colours may vary, for example a bright red could be described as either a scarlet, crimson, or vermilion. This research, in seeking to establish how the use of colours in Japan relates to *gyotaku* looks into the historical uses of colour and its cultural significance. Despite the fact that yellow, *ki-iro* is a widespread colour used in *gyotaku* it is historically considered a subsidiary colour in Japan. The yellow robes symbolic of the emperor in China were not adopted by the Japanese. Instead the Japanese aristocrats embodied their own colour value system of position and rank which saw persons of lower ranks with neither a position nor official post dressed in a yellow uniform. In fact a brown of a yellowish shade and orange were the colours restricted for use by the emperor and crown prince respectively (Varichon, 2006).

The earliest examples extant of *gyotaku* were printed in black such as the crucian carp of 1839 and the sea bass of 1857 and 1862. Polychromatic *gyotaku* is thought to have been introduced by Kouyou Inada (1897-1974) in the late 1940's and early 1950's, as discussed in chapter one. Inada started to develop polychromatic *gyotaku* at a time when Japan was still recovering from the aftermath of the Second World War and both the materials and specimens to print with were in short supply. Therefore, it is feasible that earlier examples of polychromatic *gyotaku*, may be

discovered that were produced by *gyotaku* practitioners from an earlier period. The introduction of colour is one of the main contributing factors which helped to develop *gyotaku* from a record of a fisherman's catch (made in a single colour), to the recognised art form as it exists today. It is not certain why Kouyou Inada started to use colour or why he decided to use the indirect *gyotaku* method to produce his works rather than the direct *gyotaku* method as both are equally suited for this purpose.

4.4.1. Black, *Kuro* / *Kuroi*

Black is the main colour used in both the 'Hawaiian' *gyotaku* technique and the direct *gyotaku* (trophy prints) used to verify the size of a fisherman's catch:

> "In Japanese art, both fine and decorative, black is one of the most distinguished colours. Black lacquerware – once known in English, significantly enough, as "japan" - has been produced continuously in Japan from the Pre-Christian era to the present day, and may well have attained the highest degree of technical sophistication of any craft in the whole history of Japanese art. The beauty of black lacquer with its burnished, mirror like surface exerts the same fascination over us today as it did over the nobles of the Heian period" (Hibi & Fukuda, 2000, p.72).

Black monotone Chinese ink painting, *sumi-e* or *suibokuga,* flourished in Japan during the thirteenth to the fifteenth centuries until a distinctively Japanese style evolved in the sixteenth and seventeenth centuries. The black sumi ink used to create these paintings is also one of the most important and only black medium used in Japanese woodblock printing. For woodblock printing:

> "The most practical form of *sumi*, however, is a liquid called *bokujū.* It is a very strong black, relatively inexpensive and can be thinned to give the palest grey. Japanese *bokujū* is more expensive than its Chinese equivalent which is also suitable for use" (Salter, 2001, p.27).

In Japan black has both formal and spiritual overtones; from the wearing of the black *montsuki* [32], for formal occasions, martial arts and the theatre, to the representation of the universe

32 A *montsuki* is a simple and elegant style of *kimono* which are distinguished by the white crest or *mon,* which are used to identify specific membership of an organisation or clan. *Mondokor*o and *kamon* crests or emblems can also be used to decorate *montsuki w*hich designate and identify specific family members.

as seen in *sumi-e* or *suibokuga*. *Sumi* ink remains a popular medium in Japan for creating *gyotaku* and is often used in preference to oil-based inks (Figure 50).

Figure 50 - Barfin flounder, *Verasper moseri*. Direct *gyotaku* 59 X 42 cm in black and yellow hues by Okano. Image courtesy of © Oceanographic Museum Monaco.

4.4.2. White, *Shiro* / *Shiroi*

White, has a spiritual significance similar to black and can be found in Shinto and Buddhist rituals. It is used to symbolise purity. Temples and shrines are often decorated with white sand and pebbles and strung with rope made from rice straw (*shimenawa)* and decorated with zig-zag shaped white paper called *shide* as illustrated in Figure 110, chapter six, at the shrine of the paper goddess, Kawakami Gozen. White is also appreciated in ancient architecture such as that of the Himeji Castle in Hyogo Prefecture. This building is commonly known as the 'white egret castle' *Shirasagi*, due to its elegant and tall structure thought to resemble the form of a Japanese white egret, *Egretta garzetta* (Macintyre, 1981). White is a particularly useful colour for all *gyotaku* techniques. It can be; mixed with other colours to give more realistic hues, applied to the eye to give a highlight and used to accurately depict the camouflaging or patterns that occur on fishes bodies. Many pelagic fish have a darker colouration on their dorsal surface with a lighter coloured ventral area.

This form of camouflage is called 'counter shading' (Figure 51) or 'Thayer's Law'[33] and is found in several species of mammals, reptiles, birds and fish.

Figure 51 - red sea bream, *Pagrus major*. Direct *gyotaku* demonstrating 'counter shading' or Thayer's Law'. White ink mixed with blue gives the lighter ventral area and a highlight to the eye. 94.5 X 51 cm by Wakase-do. Image courtesy of the © Oceanographic Museum Monaco.

The majority of *gyotaku* impressions are made on white substrates which allow for colours to be added to the image and/or background and for the easy printing of composite images. The soft white hues of traditional *washi* is much admired by the Japanese. Junichirō postulates:

> "Western paper is to us no more than something to be used, while the texture of Chinese paper and Japanese paper gives us a certain feeling of warmth, of calm and repose. Even the same white could as well be one colour for Western paper and another for out own. Western paper turns away the light, while our paper seems to take it in, to envelop it gently, like the soft surface of a first snowfall. It gives off no sound when it is crumpled or folded, it is quiet and pliant to the touch as the leaf of a tree" (Tanizaki, 2001, pp.17-18).

Contemporary *gyotaku* practitioners often make use of some form of opaque white (Figure 52) to print on to dark coloured or black substrates. In this method the printed images can simply be left white, additional colours can be mixed with the white to create a range of opaque shades or the white can be allowed to dry and the colours painted in by hand.

33 Abbott Handerson Thayer (1849-1921) was an American artist, teacher and naturalist who was one of the first to investigate and write about counter shading in his book titled 'Concealing- Colouration in the Animal Kingdom: An Exposition of the Laws of Disguise Through Colour and Pattern, Being a Summary of Abbott H. Thayer's Disclosures', which was published in 1909.

Figure 52 - An example of white on black direct *gyotaku* of an Octopus (species unknown) with white painted self portrait by the late artist Jerry Cibilic (1957- 2011) Photo taken on 28 September 2010 by Elisabetta, from left to right, Rachel Ramirez, Jerry Cibilic and Dr. F.G. (Eric) Hochberg.

4.4.3. Red, *Aka* / *Akai*

Blood, fire, passion and the sacred are all represented by the colour red in Japan, similar to many cultures across the world. The red colour called *shu* (vermilion red made from mercury sulphide) was often found alongside human remains in the prehistoric tumuli of Japan. *Shu* is also a popular colour for lacquerware as well as red oxide. A red of a dark red/orange or tan colour was made from red oxide of lead and was the first colour used to hand paint the black and white woodblock prints made after the 1700's. *Iro-e* is a coloured over glaze used on a type of Japanese porcelain ware called *imari*. The earliest Japanese porcelain was produced in the town of Artia in the Saga prefecture of Kyushu in 1616 (Rousmaniere, 2007). It is renowned for its use of either a red, (which predominates all the other colours used in the decoration), or of the simple cobalt blue on white. Red is also a colour used for celebration and can be seen on the decorations and costumes at various festivals throughout Japan. The Children's Day festival (originally the Boy's Day festival)

is celebrated on May 5. The outside of houses and public spaces are decorated with *Koinobori,* carp windsocks, or carp banners. Although contemporary *Koinobori* are available in a range of colours and designs the traditional set of colours are hung as follows; from the top of a pole down, a pair of arrow-spoked wheels, *yaguruma with* a ball shaped spinning vane on top is followed by a multicoloured streamer which looks like a windsock, *fukinagashi,* then a black carp that represents the father. The red *Koinobori* symbolises the feminine and the mother of the household. Each child of the family is represented by a blue or green *Koinobori* (Wainwright, 1935). The red snapper, *Lutjanus campechanus* (Figure 53) similar to freshwater carp are a very popular fish amongst *gyotaku* practitioners, not only for its interesting colour but also for its overall shape and well defined scale pattern.

Figure 53 - Red snapper, *Lutjanus campechanus* with coral and seaweeds, direct *gyotaku* by Fred Fisher. Image courtesy of www.aquatic-impressions.com

4.4.4. Brown, *Chairo*

Chairo the Japanese name for brown meaning 'tea colour' is a relatively new name for a colour not having appeared until the Edo period (1600-1867). Although brown was a constantly present colour in ancient Japan found in everyday surroundings and nature, it is thought that this colour was not regarded as a hue in its own right until tea drinking became widespread. During this period brown was a fashionable colour used in the un-painted wooden architecture often found in tea houses and the bamboo and ceramic tea utensils. Woodblock prints of *Kabuki* plays from the late eighteenth century frequently depict the actors dressed in their favourite shade of brown (Hillier, 1985). In fact well-known actors such as Iwai Hanshiro IV have their names prefixed with a particular brown, Iwai brown. The costumes for *Kabuki* plays made use of paper stencils for their textile designs. One of the principal factors that spurred the widespread use of stencils was the availability of good quality *washi* which was treated with persimmon juice to bond the layers of the paper stencil together and to strengthen them (Straits & Salvesen, 2002). Thus all paper stencils appear brown. Brown is a versatile colour used by *gyotaku* practitioners, which can be achieved by the overprinting of layers of colour as in the indirect *gyotaku* technique (Figure 54) or by direct application onto the surface of the fish, as in the direct *gyotaku* method.

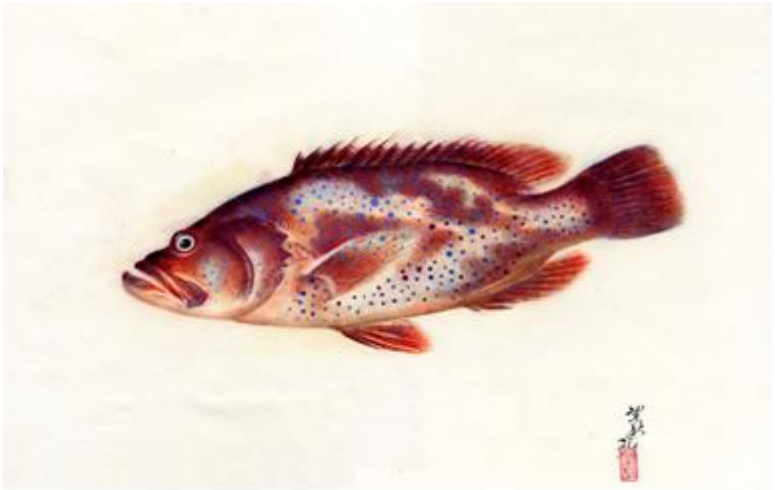

Figure 54 - Indirect *gyotaku* of *Cephalopholis taeniops*, showing various reddish brown hues by Boshu Nagase. 54 X 48 cm. Image courtesy of © Oceanographic Museum Monaco

4.4.5. Blue, *Ao*

Blue was an ever present colour in Japan the same as brown. Everyday items of apparel such as working clothes, mosquito nets, quilts and *noren* (the short divided curtains hung over the entrances to shops and restaurants) were dyed with indigo (Hibi, 1989). Blue and white ceramics known as *sometsuke* were produced with a blue under glaze pattern on a white ground from a mixture of cobalt blue known as *gosu:*

"This combination of white and blue proved highly attractive, and was not only used for objects of everyday life but came to be highly prized in the fields of fine and industrial art also. Even today, it remains one of the favourite colour combinations of the Japanese" (Hibi & Fukuda, 2000, p.28).

Prussian blue (called *berorin* in Japanese) was discovered in Europe in 1704 and was brought to Japan by the Dutch. It was used for woodblock prints called *aizuri* (indigo prints), which were devised as a substitute for polychrome prints, an edict issued in 1841 by the shogunate (Fahr-Becker, 2007). An outstanding example of *azuri* prints is Hokusai's 'Thirty six Views of Mount Fuji' a series of forty five woodblock prints. In *gyotaku* printing blue is frequently added to white to create highlights on fish, or to colour the paler ventral side. It is also used as a main colour and for mimicking realistic patterns.

Blue colours are frequently used by *gyotaku* practitioners as they are found naturally in a variety of fishes and are sometimes used to represent water for the backgrounds of fish impressions (Figure 55)

Figure 55 - Direct *gyotaku* by Naoki Hayashi applied to surfboards demonstrating a range of fishes with naturally occurring blue colouration. Image courtesy of www.*gyotaku*.com

4.4.6. Green, *Midori*

The Japanese often associate green with new life and the beginning of spring. *Midori* means green and greenery. The evergreen pine tree is a common design element in Japan and represents long life and the imperishable. Because of this their dark green colour is respected as something sacred (Fahr-Becker, 2001). In *nihonga*, Japanese style painting, a naturally occurring blue-green type of clay or *rukusho* is used to represent bamboo, pine trees, grasses and other forms of greenery. The mirror like appearance of the lookdown fish, *Selene vomer*, is difficult to capture and is often represented by *gyotaku* practitioners in various shades of green (Figure 56). Forty years of conventional wisdom regarding fish camouflage was overturned in 2013 by a report published by researchers at the University of Austin Texas:

> "The researchers found that lookdown fish camouflage themselves through a complex manipulation of polarized light after it strikes the fish skin. In laboratory studies, they showed that this kind of camouflage outperforms by up to 80 per cent of the 'mirror' strategy that was previously thought to be state-of-the-art in fish camouflage." (Cummings, 2013, n. p.)

Figure 56 - Lookdown fish, Selene vomer direct *gyotaku* with hand colouring by Kim Workman. © Kim & Ian Workman 2005-2012. Image courtesy of www.Kimiansart.com.

4.4.7. Purple, *Murasaki*

Although purple is not a commonly used colour in *gyotaku* of aquatic life it is often used for flowers in *gyotaku* botanical prints. *Murasaki* is generally translated as purple although it covers a wide range of colours such as violet and mauve depending upon the proportions of red and blue in their mixtures. The author of one of Japan's classic works of literature, 'The Tale of Genji' developed such a passion for the colour purple that her main female character is given the name *Murasaki* and the author herself was known as 'Lady Murasaki' (Rimer, 1988). Purple the archetypal sacred or noble colour has a great cultural significance in Japan and many words were

developed to describe the various shades of purple often named after a particular flower such as violet, gentian, iris, etc.

In addition to the colours discussed the Japanese industrial revolution of the late 1800's witnessed the introduction of a range of colours produced from synthetic pigments and ostensibly used in the oil based inks for lithography and the mechanisation of the textile industry. Despite these new technologies and to some extent the use of harsher Western colours, the traditional fine and applied arts of Japan survived and the 'old colours' of Japan are still used. Some such as the indigo dye was so popular that it became a kind of 'national brand'. Even today the most common colour for school uniforms, businesses and other institutions in Japan is the navy blue colour originally manufactured from indigo. Of course the historical use of colour in Japan should always be considered in juxtaposition with the context in which the colours would be viewed, namely in the dim light from candles and lanterns and in the shadows and darkened recesses of Japanese traditional architecture, before the Tokyo Electric Lighting company commenced operations to supply the public with electrical lighting in 1887.

4.5. Perspective and Composition

Simply described perspective is the means of representing a three-dimensional object on a two-dimensional surface to convey the impression of depth, height, width and relative distance:

> "It took a long time for perspective to be understood, because our visual systems are so adept at converting perspective information into depth information that most of us cannot consciously see receding lines as convergent. It is for this reason that I suspect that those with poor depth perception may have an advantage in art. I suggest that artists that to excel at conveying depth paradoxically may have poor depth perception. Seeing the world as flat might just be easier for them (Livingstone, 2008, p.103).

Composition refers to both a work of art and the way in which a whole work of art is composed various elements. Visual perception and with it the concepts of composition, perspective, (including depth) and colour are closely linked to our ideas about beauty. It was recently announced

that the largest medical research charity in the UK, The Wellcome Trust', which has a history of funding art projects that explore and illustrate science, will be investing one million pounds into research that will examine the nerve mechanisms which explain beauty. The project is led by Semir Zeki, the Professor of Neurobiology at University College London. A team of researchers from the arts and humanities as well as science have been brought together for this project. Zeki's research complements the work of other neurobiologists such as Hideo Sakata Professor of Neurobiology at Nihon University, Tokyo. Sakata's research:

> "on how the brain sees and portrays depth, gives the art world great insight into one of the most difficult tasks artists undertake. Sakata discovered that monkeys (their visual system is analogous to humans) have neurons whose task is to combine specific visual depth-cues (such as shading, texture) with linear perspective. Sakata says Cezanne unwittingly portrayed this by painting the "same" cues the brain uses: compare his "Mt St Victoire" with Renoir's and your brain will see the difference" (Duffles, 2002, p.1).

Perhaps this research will give greater clarification about the concepts of beauty in the arts of different cultures and contirbute to new theories in the study of the history of art.

There are numerous recognised aesthetic styles within Japanese art and design although the only ones considered in this thesis are those which may be relavant to *gyotaku.* Japanese compositions often reflect incompleteness because the beauty of omission is valued. An empty space allows the eye and the imagination to fill in what is not depicted. This restraint and understatement as well as a great repect for craftmanship are charecteristic of *shibui:*

> "These qualities of simplicity, hidenness and restraint do not eixst independently in an object that is correctly said to be *shibui.* Indeed these *shibui*-making features interpenetrate one another. The simplicity in style works hand in hand with restraint; for to leave a design unadorned is to exercise restraint; for one who would incorporate a hidden aspect into a work of art, simplicity and restraint are ready-made means to this objective: the simple and restrained surface invites the appreciator to look for more, for something not readily apparent, for something hidden." (Mazhar & Wilkinson, 2006, p.228).

Some aspects *of shibui* are present in the plain undecorated back grounds of some *gyotaku*. There is no need to represent a background, the fish float or swim in an empty space. The fish is the main focus of attention and it is implicit that a fishes natural habitat is either saltwater or freshwater.

This feature of many *gyotaku* prints is seldomly seen in Western art where the backgrounds of still lives and other forms of pictoral narratives are represented and form complete scenes. It is only in the majority of Western natural history illustration of fishes from the 1600's onwards that the backgrounds are not depicted.

Undoubtedly, the Japanese idea of beauty has influenced *gyotaku*. Over time the compositions and perspective used in *gyotaku* have developed from a single fish printed from the lateral viewpoint to dorsal and ventral *gyotaku*. Of course a lateral print of a fish enables a fisherman to verify the exact size of his catch. As *gyotaku* developed practitioners sought to create images that portray the beauty and uniqueness of the fish's forms and with the introduction of colour, to capture their textures, patterns or markings. The fish and other aquatic life are arranged to suggest either movement or stillness in water. Movement is often portrayed by the alignment of the fish on the substrate and stillness is often portrayed by petals, aquatic plants or pond-skaters floating on the surface of the water with the still fish underneath. These 'still' images are similar to photographs in the sense that they capture a moment in time before the fish move or dart away for cover. A perfect example of this can clearly be seen on page 11, in the 1972 publication *Gyotaku An Art of Fish Print* (Hiyama, et al., 1972). An indirect *gyotaku* of three mountain trout made by Koyo Inada and reproduced on page 11 is printed in full colour with pink and white blossom floating on the surface of the water in a pattern which suggests they have been gently moved into position by a gentle breeze. The water is not painted in but it is imagined, one fish can be seen to be raising its head slightly above (where the water would be).

Dorsal and ventral *gyotaku* impressions (Figure 57) are particularly suited, although not only, for flat fishes. Examples of dorsal and ventral *gyotaku* were published by Kodansha in the 1972 book, '*Gyotaku* An Art of Fish Print' edited by Dr. Hiyama et al, which features text in both

Japanese and English. This book showcases the works of the members of the group *Gyotaku-no-kai.* Some examples of dorsal and ventral compositions are seen in the work by the group's founder members such as:

- Page 2 Yutaka Aso's direct *gyotaku* of a goby depicts a dorsal view of a single fish in a horizontal position on the plain white substrate. The fish head is pointing to the right hand side of the substrate with the tail slightly raised.
- Page 13 features an indirect *gyotaku* of a catfish by Koyo Inada. The dorsal view of the catfish is arranged in an S-shape with the tail raised and the head pointing down towards the left side of the substrate. The fins and 'whiskers' are clearly defined and pale printed images of plants give an appearance of depth.
- Page 21 an indirect *gyotaku* of a flat head by Yukoku Inada features two fish laying in a horizontal arrangement on the substrate. The lower fish is black with blue detail in the eyes and is a dorsal view with the head facing to the left on the substrate. The upper fish is in a ventral position, printed in soft black and grey mixed with white. Its head is facing towards the right hand side of the substrate. The background is a brownish shade and appears as if it has been painted as brush marks are visible, (it is difficult to be certain of this as these images are viewed as reproductions)
- Page 34 a flat head in the direct method by Yoshio Hiyama. The dorsal view of this single fish printed in black has a particularly pleasing appearance as the fish head faces down on the left side of the composition and the body and tail have been arranged in a gently flowing curve which gives the appearance of movement through water.

Listed here are only a few examples of dorsal and ventral view *gyotaku* in both the direct and indirect techniques. However this publication features a total of twenty six images of these viewpoints and include fishes, lobsters, crabs and shells.

Figure 57 - Indirect *gyotaku* by Boshu Nagase. Bartail flat head, *Platycephalus indicus.* An example of a composition showing the dorsal view. 43 X 34.4 cm Image courtesy of the© Oceanographic Museum Monaco.

It is also evident in the 1972 *gyotaku* publication (Hiyama, et al., 1972) that the backgrounds to some *gyotaku* impressions are treated in several different ways. For example:

- Page 30 features a red sea bream by Yoshio Hiyama in the indirect technique. The single polychrome fish is in a horizontal composition with its head facing towards the left. The background of the print appears to be painted in several shades of pale green.
- Page 31 features a pollack also by Yoshio Hiyama in the indirect technique. The single brownish coloured fish is arranged diagonally on a background made from various shades of bright blue, dark blue and white, which appear as if they have been painted in a quick gestural manner and give the appearance of texture.
- Page 57 features an indirect *gyotaku* of five ayu-smelt by Hattei Takahashi. The background to this is sprayed or splattered with a fine mist of grey. The ventral area surrounding the three fish in the foreground appears as if it has been painted in the oriental method of applying water to repel paint from certain areas. In this technique the five fish would be masked with paper stencils, the water painted around the three fish in the foreground and then the whole image

sprayed with the fine mist of grey. Many *Gyotaku* books in Japanese feature this method of spraying the backgrounds with an inexpensive metal mouth spray diffuser with a plastic mouthpiece (sometimes called a mouth atomizer) as used in watercolour painting or to spray fixative onto a drawing.

However, the treatment of backgrounds developed as compositions began to make use of colour washes to represent water and to include items from the fishes habitat such as rocks, pebbles, seaweeds and underwater flora, or the 'fish out of water' compositions which may include bamboo baskets, fishing nets, plants and edible foodstuffs that accompany a particular fish.

Another treatment for the backgrounds of *gyotaku* prints, which like colour washes and spraying, is still used today is the art of Japanese marbling (Figure 58):

> "*Suminagashi*, or 'spilled ink', refers to a technique of decorating a sheet of paper with ink patterns floating on the surface of water. It differs from Western marbling in two basic ways. One is that *sumi*, or Chinese ink made from pine soot, is the core material, though not necessarily the only ink used. The other is that for *suminagashi* no additive is used to thicken the water, while for Western marbling the water is thickened to ensure that the pigments do not sink, but remain on the surface."(Chambers, 1991. p. 6).

Traditionally, a red sea algae that grows abundantly along the rocky coast of the Atlantic is used as a thickener. This is commonly known as 'Carrageen moss' or 'Irish moss' and is boiled to make a jelly which can be added to the water for Western style marbling.

Figure 58 - Ling cod, *Ophidon elongatus*, direct *gyotaku* on suminagashi background by Don Jenson. Image courtesy of www.catchofthedayoregon.com

Members of the *Gyotaku-no-kai* group experimented with transferring direct *gyotaku* images onto a range of objects such as folded paper fans, handbags and *noren.* Hidenosuke Tanaka, one of the founders of the group *Gyotaku-no-kai* uses the transfer method which he developed called *Tensha-ho.* Although this method is little used by contemporary *gyotaku* practitioners Tanaka's work demonstrates the fine details which can be achieved in his transfer *gyotaku* prints of an iris, a bamboo sprout, a mantis with its wings extended and two arctoscopus fish, which are applied to flat paper fan shapes (Hiyama et alo., 1972, pp. 38-39). The fan shape composition is a common form in Japanese art and features in many woodblock prints.

Certainly the aesthetics of Japanese woodblock prints have influenced *gyotaku.* From the end of the eighteenth century onwards Japanese woodblock prints were produced in vast quantities to meet a growing popular demand. Unique images of nature including fishes and other aquatic life, formed part of the subject matter for woodblock prints, the two principal artists responsible for introducing these themes were Katushika Hokusai (1760-1849) and Ando Hiroshige (1797-1858). Perhaps some of the most well-known woodblock prints of fishes were produced by Hiroshige. Two sets of fish prints were produced the first and larger set features twenty prints of fishes and

crustaceans. Ten of the large fishes were published by Eijudō, mostly in 1832. The ten other prints were published at a later date by Marujin (Maruya Jimpachi) and Yamashō (Yamadaya Shōjirō). Each print suggests a particular season as the fishes are juxtaposed with the plant or flowers depicted at the time of year which is traditionally associated with each fish. Holme's (1980, p.3) posited that "The fish representing 'the seasonal joy that visits every kitchen door' were published with the cooperation of Kyōkashi, a guild of poets who wrote short light verses to accompany the prints." To some extent the seasons are represented by fresh agricultural produce in some of the *gyotaku* works created by Boshu Nagase. His *gyotaku* of the Japanese whitespotted char (Figure 59) called *Iwana,* is a fish found in the Mountain Rivers and ponds of inland Japan, (an ocean run form also exists). This popular fish is served char grilled and as *sashimi* (raw fish) throughout Japan.

Figure 59 - Whitespotted char, *Salvelinus leucomaenis* with chestnut. Indirect *gyotaku* by Boshu Nagase. 70 x 49 cm. Image courtesy of © Oceanographic Museum Monaco

The chestnuts seen in Nagase's *gyotaku* (Figure 59) are called *kuri:*

"This Japanese variety of chestnut is grown throughout Japan and the southern Korean peninsula, and has a more triangular shape and smoother shell than the Chinese, European or American varieties. *Kuri* represents autumn and is a useful way to express the season in dishes for *kaiseki* (formal banquet) or tea ceremony cooking" (Kazuko, 2001, p.57).

Dr. Hisao Ishigaki a well-known practitioner and teacher of *tenkara* (a form of Japanese fly fishing) also creates *gyotaku*. His indirect *gyotaku* often depict fishes that he has caught himself using *tenkara* and feature two of the developments which occurred in *gyotaku*, evident from works of the members of the *Gyotaku-no-kai* group. These are depicting the habitat of the fish (Figure 60) and the printing of traditional bamboo mats and baskets sometimes with additional plants to make simple still life compositions which imply that the fish are about to be prepared for a meal (Figure 61).

Figure 60 - Indirect *gyotaku* by tenkara practitioner and teacher Dr. Hisao Ishigaki. Image courtesy of http:www.discovertenkara.co.uk

Figure 61 - Indirect *gyotaku* by Boshu Nagase. Japanese half beak, *Hyporhamphus sajori*, composition on a bamboo basket with foliage. 50 x 56 cm. Image courtesy of © Oceanographic Museum Monaco.

It is often assumed that because early *gyotaku* practitioners made use of sumi water-based inks that all *gyotaku* techniques needed to be printed onto white or very pale substrates in order to create a technically competent impression. However, Yoshi Hiyama's print on page 32 entitled 'Butter fish' (Hiyama et al., 1972) features an indirect *gyotaku* of a single fish on a black background although it is not certain if this background has been painted after the fish was printed or if the image was created on a black substrate. In *nihonga* painting several opaque colours can be achieved one of which is white:

> "Gofun is a white pigment made from ground, weathered oyster shells. If made with the correct proportion of nikawa it produces a glowing almost luminous white, but can only be seen once it dries, as it is transparent when in solution" (Grantham, 1997, pp. 22-23).

Clearly the majority of *gyotaku* fishes are by necessity printed from the lateral, dorsal or ventral view point with the backgrounds remaining plain, coloured or with the addition of natural habitats or man-made items. There is very little evidence of fishes being printed with a head on view as the majority of fishes are not suitable for this, although there is some early evidence of this type of composition in the form of an indirect *gyotaku* made by Choyu Tokii of three butterfly fish.

The smaller of the three fish has it's head facing straight on with its body turned to the left side (Hiyama, et al., 1972). Of course some head parts of fishes may prove ideal for this such as monk fish (a number of fishes of the genus *Lophius* and angelshark genus *Squatina)* although these are generally printed from the dorsal or ventral sides. The jaws from sharks create ideal *gyotaku* prints and Adam Cohen and Ben Labay working together as 'Inked Animal' have produced graphic image from the jaws of a bull shark, *Carcharhinus leucas* (Figure 62).

Figure 62 - Direct *gyotaku* of a bull shark, *Carcharhinus leucas*, by Adam Cohen & Ben Labay, 'Inked Animal'. Image courtesy of www.inkedanimal.com .

Another major development in *gyotaku* is the production of large scale underwater scenes. Koujin Taniguchi (b. 1949) first started *gyotaku* printing in the direct technique in 1976. Since then he has developed and promoted the full colour direct *gyotaku* as an art form. He was delighted to take on the commission for *gyotaku* prints to decorate the windows of the Daiki Fisheries Sushi Place, located on the fourth floor of Q's Mall, in Abeno-ku, Osaka, Japan. This is Taniguchi's largest *gyotaku* print measuring 92 to 130 cm in height by 11 meters in length (Figure 63). The print is displayed in different windows (Figure 64) of the sushi restaurant and is designed to be one large underwater scene featuring a variety of fishes, rocks, seaweeds and octopus.

Figure 63 - A section of Kouji Taniguchi's direct *gyotaku* in the window of the Daiki Fisheries Sushi Place, Osaka, Japan. Image courtesy of www.khojin.jp

Figure 64 - Another section of Kouji Taniguchi's direct *gyotaku* underwater scene. Image courtesy of www.khojin.jp

Fish in ponds, iris flowers, calligraphy and patterns which abstract water or waves are all popular and symbolic motifs found in Japanese art. These elements are present in Taniguchi's *gyotaku*, as well as prints produced on the vertical, suitable for mounting on traditional Japanese hanging scrolls. He has produced an image which includes fish in a pond and iris flowers growing beside the pond (Figure 65). The wooden border of the pond is a direct *gyotaku* printed from a piece

of timber and although the iris leaves are printed it has not yet been confirmed if the purple flower heads are also created from direct *gyotaku*.

Figure 65 - Iris flowers, wooden timber and fish in a pond by Kouji Taniguchi. Image courtesy of www.khojin.jp .

It is often assumed that 'perspective pictures' called *uki-e* in Japanese which make use of linear perspective and chiaroscuro developed from European artistic influences:

> "It cannot be ruled out, however, that the first impulse for the creation of *uki-e* came not straight from the Western works but indirectly from Chinese landscape prints created under the influence of European prototypes. In particular there was a strong influence from the *megane-e* (literally 'spectacle pictures'), which were produced in large numbers in the southern Chinese city of Suzhou. Such works were enormously popular in Japan and often shown in *nozoki- karakuri*, a type of peep show in which the picture was first reflected in a mirror and then viewed through a magnifying glass to intensify the perspective effects and chiaroscuro, giving the illusion of three-dimensionality." (Upensky, 1996, p.10).

Hokusai and Hiroshige both wrote instructional manuals for artists demonstrating and explaining the ideas of European perspective. And it is the particular compositional elements and perspectives of the woodblock print in Japan that undoubtedly had an aesthetic influence upon *gyotaku* (Figure 66).

As *gyotaku* spread from Japan to America it was not only the introduction of oil-based inks and a variety of substrates which had an effect upon *gyotaku* it was also the different cultural ideas

of beauty. Although the early American *gyotaku* practitioners closely followed and tried to echo the sensibilities of the Japanese *gyotaku* practitioners it is inevitable that their own style developed from a very different cultural perspective. Some of these styles and the expansion of the subject matter is discussed in the next section, 'New Directions in *Gyotaku*'. Moreover, it should be remembered that although the printing of dried specimens may appear relatively new this was also something practised by members of *Gyotaku-no-kai*. Yoshinori Sato's indirect *gyotaku* of ten dried shrimp, on page 107 (Hiyama et al., 1972) their heads all facing towards the left with the centre part of their bodies joined together with straw a traditional way of wrapping or hanging food stuffs in Japan and small green foliage was created sometime before 1972.

Figure 66 - Contemporary composition of fish in an abstract water pattern, with a creative use of colour. Direct *gyotaku* by Koujin Taniguchi. Image courtesy of www.khojin.jp .

4.6. New Directions in *Gyotaku*

An age old debate that is frequently raised both at international conferences such as the bi-annual IMPACT, (International Multi-disciplinary Printmaking Artists, Concepts and Techniques)[34] and within printmaking publications and journals is the classification of an 'original print'. However, this debate appears somewhat redundant considering that artists have not always printed their own works (hence the role of 'Master printmaker' at publishing/printmaking studios) and the wealth of new technologies and mixed printmaking processes, that are readily accessible to contemporary printmakers. Certainly printmaking processes such as; lithography, intaglio, relief printing and screen printing are well-known and accepted within the field of fine art printmaking and others such as digital printmaking, giclee, and to some extent 3D printing are often considered as reproduction printing rather than fine art printmaking. Regardless of these debates within fine art printmaking, the major disadvantage for the acceptance of *gyotaku* printing into the field is that it is still a marginalised process that many people involved in the visual arts have not yet heard of. However, this is changing gradually as *gyotaku* practitioners have their works accepted in major international printmaking exhibitions, art competitions and exhibited in art galleries.

The 'Annual World Art Mini Print Exhibition' held in the Lessedra Gallery in Sofia Bulgaria is an international, curated exhibition that showcases the works of contemporary printmakers from around the world:

> "While the event started in 1991 it really began to take off after 2002 when Georgi Kolev, current owner and director of the gallery started to work on the event to make it the huge success that it is today. By 2006 over 500 artists from more than 60 countries were represented in the event." (Roman, 2009).

34 "The idea for the first IMPACT conference was developed by Richard Anderton and Professor Stephen Hoskins based on their joint visits to the American Southern Graphics Council conferences in the early 90's. They realised there was no international forum specifically for printmakers and created IMPACT." (www.uwe.ac.uk). A conference has been held every other year since it's incept in 2009. The next IMPACT will be hosted by the China Academy of Arts, Hagzhou, in 2015.

One of the artist Chloe Dee Nobel, has had both nature prints and *gyotaku* works selected for exhibition. In 2013 Nobel's' miniature *gyotaku's* titled 'Noble Scallop', and 'Fish' were part of the12th Annual World Art Mini Print Exhibition. Her print works often incorporate areas in relief and braille, specifically designed to be touched. These print works developed not only from her own creative process but also from necessity when Nobel lost her sight, several years ago. She was already an established artist when she was bitten on the nose, when sleeping, by a brown recluse spider and the effects of the venom caused Nobel's loss of sight. After this incident she attended her local school for the blind in Pacific Grove California, USA and developed ways to continue with her creative practice, specifically with sculpture and printmaking. Nobel's works were made to be touched but were also informed by touching during the process of making. *Gyotaku* and nature printing proved ideal processes as Nobel could feel her subjects through the paper. In May 2012 Nobel received a corneal transplant and recovered one hundred percent of her vision (Nobel, 2001, n.p.)

Gyotaku works have also been selected for exhibition at the 'Chinese Zodiac International Print Exhibition' which has taken place annually for over twelve years and is organised by the Proof Studio Gallery in Toronto, Canada. 2011 was the Chinese Year of the Rabbit and Vanessa Cornell's work titled 'The Rabbit' was exhibited as a "Relief *Gyotaku* style (Print from the actual animal hide)". Sheila Johan (2011, n.p.) of the Proof Studio Gallery commented "Over 130 'Year of the Rabbit' inspired prints were on display including; screen, litho, intaglio, relief, embossing, letterpress from Canada, USA, Ireland, England, Germany, Switzerland, Guatamala, Hong Kong and more...". Unfortunately, there is no mention of *gyotaku* in this comment about the exhibition.

Figure 67 - *Gyotaku* from the animal hide. 'The Rabbit' by Vanessa Cornell. Image courtesy of www.theyearoftherabbitprintexhibition.com

In 2013 the Chinese Year of the Snake, Alexis Williams' print entitled ' Enjoy Your Snake', a direct *gyotaku* print with acrylic and snake skin *chine collé* was selected for the exhibition at the Proof Studio Gallery. Williams created a series of *gyotaku* and chine collé snake works using anaconda, garter snake and boa constrictor skins. It is interesting to note that Williams direct *gyotaku* prints incorporate or embed the item which has been printed on to the surface of the print, in a similar fashion to the works of Canadian artist Jon-Erik Kroon. Vanessa Cornell's prints are also influenced by Kroon who taught her *gyotaku* printing (Figure 67). In his own art works Kroon utilises dried specimens, particularly fishes, plants and leaves, roadkill, animal skins, fossils and bones, as opposed to fresh fish, to create direct *gyotaku*. These specimens are generally found already dead or are donated to Kroon who dries them out flat, specifically for printing. The method Kroon has developed for printing is similar to direct *gyotaku* although once the specimen is inked (sometimes with natural pigments or dyes made by the artist) a sheet of damp archival quality rag paper is place on top and specimen and paper are run through an intaglio press to create an

impression which results in a deep embossed image. Hence the specimen is the print matrix or printing plate (Figure 68). Kroon teaches *gyotaku* and exhibits his arts works throughout Canada and the USA. Kroon proclaims:

> "As for the spiritual connection with my art making, it's a personal choice to send back to mother earth, the tanned skins and animal bones after I no longer need them. I am an artist that is merely suspending the wonders of nature from DECAY. My work is about conservation and to have the ability to suspend beauty from decay is one that requires some type of honour" (Kroon, 2007).

Figure 68 - 'Homage to the Cottontail Rabbit Killed by a VW, 1993'. Hand pulled nature print from a dried roadkill rabbit, by Jon-Erik Kroon. Image courtesy of www.artspacechathamkent.com

At the same time that works are being accepted and selected for exhibition at international print exhibitions the traditional subject matter of aquatic life (particularly fishes), has broadened to include a range of reptiles, amphibians, mammals and insects. An example of reptile *gyotaku* printing can be found in Paul Klinger's artist book which features images of an imprinted alligator made by the artist. The book was entered and accepted for exhibition at the MCBA Prize 2013. This prestigious international award for artist books is presented by the Minnesota Centre for Book Arts, USA. Klinger's book entitled 'Rubble Paper, Paper Rubble' was produced in a limited edition of three hundred by digitised graphite transfer, digitised animal prints and perfect bound. Klinger explains:

"Rubble Paper, Paper Rubble is a book project composed by visiting historical markers throughout south east Texas and making graphite rubbings from the embossed text. At its heart, the project uses poetry to make and unmake official local histories. Also included in the book are colour plates featuring a series of alligator prints I made in the field, and another alligator print is featured on the cover. These prints are made directly from the animal's body, a kind of swamp treatment of *gyotaku* printing." (Anon., 2013, n. p.)

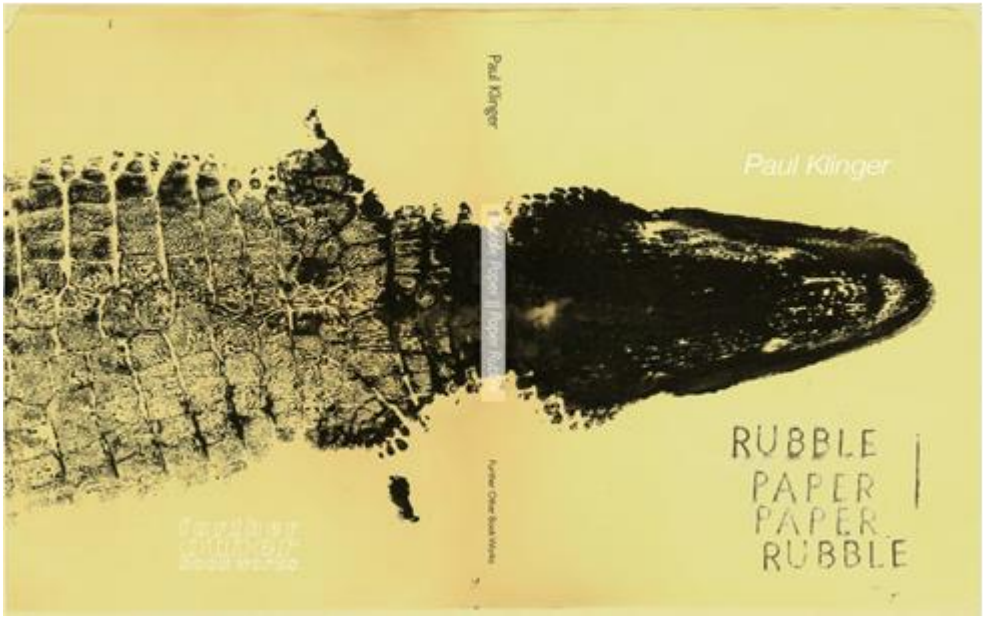

Figure 69 - Front cover of an artists book entitled 'Rubble Paper, Paper Rubble' by Paul Klinger. Featuring digitised direct *gyotaku* prints of an alligator. Image courtesy of http:www.mcbaproze.org

Another new direction in *gyotaku* printing is the revived practice of transferring images onto objects which are traditionally associated with Japanese design such as *byobu,* these are Japanese folding screens made from several jointed panels and normally feature painting and calligraphy. Kalani DeWitt Lickle has been creating *gyotaku* prints of Hawaiian fishes, octopus and bamboo since 1986 and is the founder of Natural Impressions with a website at (www.*gyotaku*maui.com). Lickle produces *byobu* featuring dramatic images of octopus using the direct *gyotaku* technique. *Gyotaku* printed on to Japanese papers have also been used to create Japanese style paper lanterns. Both the screens and the lanterns aim to emulate a particular natural Japanese style aesthetic by using realistic colours and natural wood and bamboo.

In contrast to these works with a Japanese style aesthetic, Joe Higgins creates graphic, boldly coloured, direct *gyotaku* which exist as original prints and are translated on to a range of T-shirts and baseball caps. One of his best-selling images according to the Game and Fishing magazine is the 'Wicked Boston' printed from a Tuna tail coloured to resemble the American flag (Figure 70). Rick Bach (Bach, 2013, n. p.) explains that:

> "Higgins began the practice as an amateur in 2009, experimenting mostly with striped bass and improving his technique. A lifelong graphic designer, he had an eye for art and a passion for creating it. When he was granted a free space along Salem's Artist's row, a section of town where artists can work rent-free to create and sell their products, he shifted into full-gear. He described the awarding of the free space as a "this-is-for-real" moment. His technique improved and his prints began selling. Higgins branched out, printing more different types of fish."

As his business became successful Higgins moved his *gyotaku* studio into a space at Tomo's Tackle Shop, ideally located on Salem's waterfront and the ideal location for meeting sports fishermen, many of whom are interested in *gyotaku* and ask Higgins to produce a trophy *gyotaku* of their catch. Higgins sells his *gyotaku* art prints and apparel from Tomo's and from his website at (www.fishedimpressions.myshopify.com).

Figure 70 - Wicked Boston direct *gyotaku* from a tuna tail by Joe Higgins. Image courtesy of www.fishedimpressions.myshopify.com

Scott Szegeski like Higgins practices direct *gyotaku,* but of a very different kind in Montauk, New York, USA. An avid surfer Szegeski has so far never printed a fish, his *gyotaku* art works are concerned with surfboards. The visually impressive images, which come in a range of colours, capture the history of the surfboards from their worn edges to the scratches, blemishes and even broken elements. Szegeski clarifies his practice:

> "While on line waiting for medicine for my dog, I saw *gyotaku* prints from a fellow in New Hampshire. While admiring the work a light bulb went off in my head. While I admire the beauty of fish, the subject matter didn't interest me enough to pursue full printing of actual fish. Surfboards and attachments to surfboards is what interests me. The gal or guy that carved a fishtail into a piece of foam for surfing must have been looking at actual fish tails and how they moved through the water..... it's those associations that inspire my work. The idea of printing something that might be gone tomorrow is a novel idea. The ability through an age old technique to preserve a shape that can be reproduced many, many years from now, seems important, I guess, at least to me. Any surfboard can be printed using my technique. All surfboards are printed on traditional *koji* paper from Japan. I use traditional slightly modified sumi ink. And try, when I can, to stick to the tradition of many of the printers before me" (Szegeski, 2013).

The majority of surfboard used in Szegeski *gyotaku* come from his own collection of vintage surfboards and vintage fins. Six or more prints are made from each surfboard and fin, then those boards are pulled out of rotation permanently, and surfed for the remainder of their lives. Because surfboards are made from foam and fibreglass there is always the possibility that they will get broken and so the print becomes a permanent record of their existence. He also makes custom prints for the owners of surfboards in the same manner that some *gyotaku* practitioners also print 'trophy prints' for sports fishermen. He considers each surfboard *gyotaku* is similar to a fingerprint and living proof that the shapes and colours of each surfboard did exist. Also, that there are many similarities between these man-made objects and living fish. Szegeski's surfboard *gyotaku* can often be seen adorning the walls of coastal style interiors of high quality interior design magazines published in the USA. Original framed and signed *gyotaku* surfboards (Figure 71) are available from several interior design companies such as Dering Hall, Tim Clarke and Lucca Antiques. Szegeski exhibits his work regularly in art exhibitions across the USA and at surfing events.

Figure 71 - Framed surfboards, direct *gyotaku* by Scott Szegeski exhibited at Outeast Gallery, USA. Image courtesy of www.corduroyboutique.com

Evidently the subject matter and coloration of *gyotaku* printed images is being explored and adapted for the artists own particular experiences, interests and development of their work. Olaf Altmann is a *gyotaku* practitioner who combines his interest in fishing with his airbrush skills. He has developed his own method for applying the inks to the surfaces of a fish's body using an airbrush and metallic colours in order to build up smooth, opaque layers which print easily on the dark coloured silks that Altmann has a preference for (Figure 72). His work is on permanent display at the Restaurant Fisch Fiete in Westerland, on the island of Sylt, Germany. Altmann has recently begun to use foam rollers in his indirect *gyotaku* works of large fishes. This allows him to cover the fish in white silk and print very quickly in black. Once this has been removed from the fish the impression is left to dry before colours are painted in by hand. This is a variation of the Hawaiian *gyotaku* method in which ink is applied directly on to the surface of the fish. In Altmann's method because the silk is in contact with the surface of the fishes body rather than the ink a minimal amount of cleaning is necessary after printing.

Figure 72 - *Schwertfisch auf Makrelenjagd* (Swordfish at the Mackerel Hunting) 230 X 120 cm by Olaf Altmann. Image courtesy of ww.fish-print.de

Two of the main 'new directions' in *gyotaku* are the subject matter which is being printed, pushing the limitations of the printing process and its traditional associations with fish and fishing. Also, the printing process itself is being adapted and modified in order to produce the required image and to express the interests of the particular artist. The reptiles, mammals, animal skins, surfboards and mixed printing processes such as *gyotaku* with *chine collé* as discussed are only a few examples of how *gyotaku* techniques are being used as a tool to aid the artists' creative process. Coupled with the fact that *gyotaku* is becoming a more familiar medium within the visual arts, exhibited and selected for international fine art printmaking exhibitions and competitions and displayed in art galleries and in today's ethos of environmental awareness and nature conservation *gyotaku* is increasingly becoming accepted and recognised as an art form in its own right.

5. Practitioners a Motley Group

5.1. Introduction

Currently, *gyotaku* is practised around the world by a variety of people for diverse reasons. In this chapter I seek to explain their reasons and explore their personal philosophies, influences and working practises by providing several case studies, with the purpose of not only linking the different subject areas but also providing a greater understanding of the interaction of art, science and sports fishing. I verify how these different fields may enrich each other through the practice of *gyotaku*. Several studies exist which address the working practices and comparisons between 'the creative process' of artists and scientists. However, the working practises of those who create *gyotaku*, which crosses the boundaries of these fields and includes sports fishing, have not been adequately analysed.

I chart *gyotaku* through its various applications by investigating a selection of contemporary practitioners who are aware of *gyotaku* and some examples are outlined of those who have produced or used similar techniques to *gyotaku* that perhaps fall into a different classification of work. Some people make use of printing methods similar to *gyotaku* and at the same time remain unaware of *gyotaku*. Others such as the artist Yves Klein (1928-1962) are thought to have known about the process and that it influenced their work. In an article written by Jean-Yves Mock for the catalogue of the important 1983 retrospective of Klein's work at the centre Georges Pompidou, Paris, Shinichi Segi recalled a conversation he had with the artist during his time in Japan. They were discussing the traditional Japanese technique of pressing a dead fish into ink and then against a picture surface in order to capture all the more vividly the impression of its scales and other

characteristics. “When Klein tried to pronounce the word *gyotaku*, because of his strong French accent it sounded like he had said jyotaku, a mispronunciation which he enjoyed as it means a woman, not a fish, whose imprint is made” (Klein et al., 1982, p.86).

My findings are taken from a number of sources particularly discussions, interviews, surveys and personal communications. However, due to the lack of a common language and reliable means of communication I have not included case studies of Japanese, Chinese and Korean practitioners. Japanese practitioners are discussed in terms of a number of English publications which feature their work, but unfortunately I was not able to communicate with them directly. I believe this area warrants further investigation and would provide in depth details about contemporary practitioners and perhaps further evidence concerning *gyotaku*'s' origins. It has been problematic throughout this study to strictly classify practitioners by their area of activity in relation to *gyotaku* as their interest in and activities relating to this are often multi-faceted. For example Stephen DiCerbo is a perfect example of a *gyotaku* practitioner he is a lifetime member of the Nature Printing Society, an artist, natural science illustrator and a member of the Guild of Science Illustrators, Stephen teaches *gyotaku* techniques and holds regular workshops in America, he is also an avid fisherman whose philosophy of respect through nature is demonstrated when he catches, prints, cooks and eats any edible specimens. Therefore, to facilitate the discussion about people deploying *gyotaku* approaches I have grouped them under several general sub headings;

- Artists and Variations of *Gyotaku*
- *Gyotaku* Practitioners and Masters
- Illustrators and Graphic Designers
- Teachers
- Scientists and Naturalists

- Fishermen

I have also included in this section people who have commissioned *gyotaku* such as Mitsuo Fukuchi and Harvey J. Marchant and their reasons for doing so[35].

5.2. Artists and Variations of *Gyotaku*

The exhibition '*Gyotaku l'art de lémpreinte*' held at the Fishing Museum in Concarneau, France from the beginning of June 2011 until the end of September 2012, was accompanied by the catalogue '*Gyotaku L'ãmes des Poissons*' by Daniel Pardo (Pardo, 2011). This is the first publication in French about *gyotaku.* Included in the catalogue are images of indirect and direct *gyotaku* of fishes, some of which are held in the collection of the Musée Oceanographique Monaco. The indirect images are by the Japanese Master Boshu Nagase and Nakanishi. Direct *gyotaku* works are from the Japanese artists; Wakase-do, Okano, Takahiro Saito and Mitome Yuki and from the non-Japanese artists Jean-Pierre Guilleron (b. 1964) and Pierre Alechinsky (b.1927). Alechinsky was one of the artist featured in the limited edition book *Les Rougets* published by *Éditions Fata Morgana* for which he created two *gyotaku* illustrations of fishes. Well-known for his paintings, prints and interest in Japan Alechinsky worked as the Paris correspondent for the Japanese journal *Bokubi* (the joy of ink) in the early 1950's. In 1955 Alechinsky and his wife went to Japan and in the same year it is thought that he first encountered *gyotaku*. Alechinsky admired a *gyotaku* of a sea bream and overhearing his admiration for the print the owner presented it to him as a gift. For many years the *gyotaku* remained on Alechinsky's studio wall where the paper eventually turned yellow.

The French artist Jean-Pierre Guilleron started his career with the study of Japanese calligraphy which he uses in his current artwork. His interest in Japan and marine life naturally led

35 Professor Mitsuo Fukuchi is a marine ecologist and recognised as an authority on polar marine ecology. Fukuchi with his colleague and friend Professor Harvey J. Marchant, an authority on Antarctic biology, wrote the book, *Antarctic Fishes*, which was illustrated by *Gyotaku* Master, Boshu Nagase.

him to creating *gyotaku* works. A diptych by Guilleron featuring a variety of fishes is in the catalogue but was not displayed in the exhibition. Guilleron's *gyotaku* use a combination of direct printing with sumi ink and the addition of watercolour. The technique could be described as the 'Hawaiian *gyotaku*' process as the images are not printed in a dense black as commonly found in the direct *gyotaku* technique but a very diluted black sumi ink that results in subtle grey shades. These are painted with watercolours to resemble the natural colours of the specimen.

The final section of the catalogue titled "*GYOTAKUS* ?" (Pardo, 2011, p.115) contains images of fish made by the artists Râmine Fardad and Miquel Barcelo. Pardo questions if these two artists are in fact creating *gyotaku*. Several images of fish made by Miquel Barcelo (b.1957) which were exhibited in the Lambert Foundation in Avignon, France are described by Pardo as follows:

> "La derniére salle rassemble plusieurs representations de poissons. Les encres, les pinceaux, les supports papier nous conduisent de la *Mare Nostrum* à *Cipango.* Des *gyotaku*'s revisités par lártiste majoquin?" (Pardo, 2011, p.118).
>
> ["In the back room several representations of fish are gathered. The inks, the brushes, the paper support take us from the *Mare Nostrum* to the *Cipango. Gyotaku* re-visited by the Majorcan artist?."]

The *Mare Nostrum* is Latin for 'Our Sea' meaning the Mediterranean Sea. Linguists believe the word *Cipango* probably derived from the Portuguese words used to record early Mandarin Chinese and the Wu Chinese words for Japan. From the images in the publication it is not clear if Barcelo has used a genuine fish to create these images or if they are painted (Figure 73)

Figure 73 - ‘Rap’ (monkfish) by Miquel Barcelo. 124.5 x 151.4 cm on paper, 2008. Image courtesy of artnews.org/pilarcorrias/?ex=17543

However, Fardad's work is unquestionably direct *gyotaku* which have been printed onto old Iranian newspapers (Figure 74). From looking at Fardad's website it is evident that he is aware of *gyotaku* and chose to use the technique specifically to recall his childhood memories of visiting the fish market with his mother. The fishes they purchased were wrapped in newspapers to carry home which often resulted in the ink from the newspaper transferring itself onto the fishes. In a rough translation from French he describes his childhood fish printing experience:

> “I started making sketches and drawings, failing to imitate to perfection the flounder gill and the multitude of scales I remembered printing ink dries on the paper. Then I brushed the fish with calligraphy ink and tried to make prints on drawing paper, unfortunately too stiff. Not having more flexible paper at my disposal I resigned myself to use sheets of newspaper. I was satisfied with my results” (Fardad, 2011, ¶ 1).

Today, Fardad lives in France and creates paintings, prints and collages influenced by his maritime surroundings in Brest. “Today 35 years after the first childish experiments I again try fish footprints in my new life in Brittany at the antipode of the Persian Gulf” (Fardad, 2011, ¶ 7).

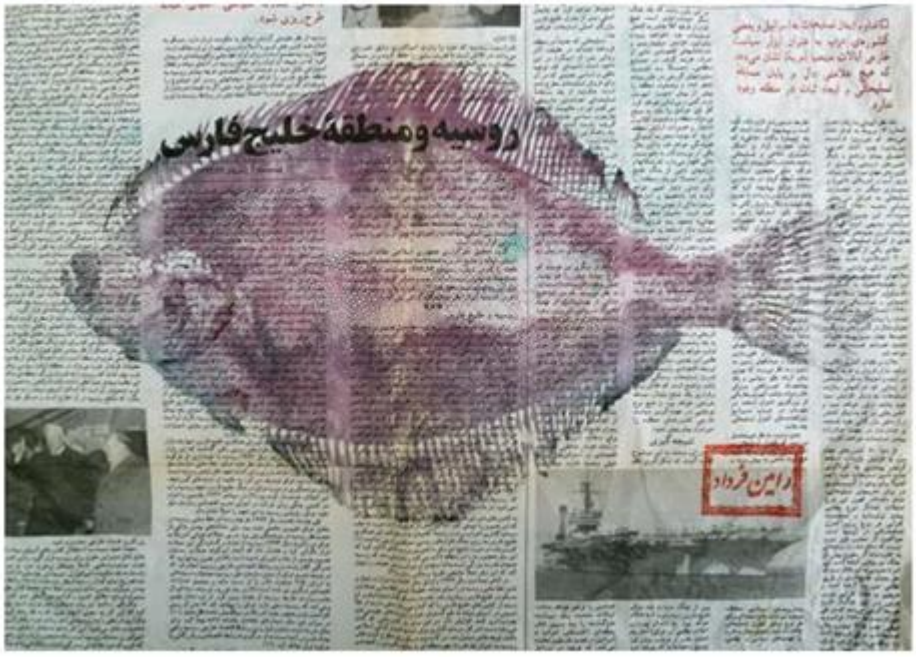

Figure 74 - Direct *gyotaku* of a flounder on Iranian newspaper by Râmine. Image courtesy of www.ramine.com

Gyotaku's executed on newspaper have been created by various artists and reflects the old fashioned convention that existed in many countries across the world of wrapping fishes in newspapers when purchased from the fishmongers. Similarly, many sports fishermen lay fishes such as eels that are covered in vast amounts of mucous on old newspapers to make handling them easier. Even the fact that 'fish and chips' were traditionally wrapped in newspapers in the UK lends itself to *gyotaku* impressions using newspapers as the printing substrate because often the *gyotaku* fishes are eaten once enough prints have been taken. The artist Jeanette Jobson in Newfoundland, printed a yellowtail flounder, as a gift for the Vancouver Shinpo Newspaper[36] when they sent her back issues to use as a printing substrate.

Jobson reports (personal communication, March 18, 2012). “In my quest for interesting supports for my *gyotaku* prints, I had an idea of using Japanese language newspapers.” Barry Singer

36 The Vancouver Shinpo Newspaper was founded in 1978 to provide information for Japanese Americans living in Vancouver

printed 'School of Business' on the stock market report page of his local newspaper in Lackawanna County, Pennsylvania, USA. He comments:

> "I made these shiner *GYOTAKU* fish prints directly on a page from the stock market reports in my local newspaper. Who understands all of those numbers? These fish have no problem just swimming past!" (Singer, n.d.).

Figure 75 - 'Woman with Octopus' by Salvador Dali. Photo by the author at the Salvador Dali Museum, Figueras, Spain.

One of Salvador Dali's (1904-1989) approaches to printmaking echoes that of early photomechanical nature printing processes. Various techniques were developed during the mid-1800's which used genuine specimens to make printing plates and once processed the plates formed a copy of the specimen which enabled large editions to be printed. Dali printed directly onto prepared lithographic stones squid/octopus coated with oily ink. This enabled further working of the image on the stone and the exact reproduction for an edition of prints, unlike the unique *gyotaku* impression. In 1963 Dali used the technique (the direct printing of squid/octopus onto a prepared litho stone) to create 'Woman with Octopus' (Figure 75). The stone litho process enabled further drawing or mark making to be added to the stone resulting in the image of the woman. This was then printed in an edition of one hundred and eighty. Another example of Dali's work which

includes an image of an octopus printed directly from the specimen is the work on paper titled 'Triumph of the Sea', signed and dated 1964. The medium for this work is listed as lithograph, gouache, watercolour and octopus ink on paper (Field, 1996).

Dali was filmed using the same technique to print directly on paper. The archive film forms part of the DVD titled 'Modern Art' directed by Academy award winner Herbert Klein (1909-1999). Subtitles in English translate Dali's dialogue as:

> "I choose the squid because Dali always was in love with soft, jellylike, super-compulsive structures and the squids continuous movement is ideally suited to the apotheosis of space" (Klein, 2003, DVD).

Even though Dali's stone lithography prints cannot be classified as direct *gyotaku* the process of applying the specimen to the stone is similar (Figure 76). The squid prints made by Dali directly onto paper are another variation of the direct *gyotaku* technique as the specimen is applied to the paper rather than the paper being placed on top of the specimen and an impression taken by rubbing with one's fingertips.

Figure 76 - Salvador Dali and an assistant placing an inked octopus on a prepared lithographic stone. Photo by the author at the Salvador Dali Museum, Figueras, Spain.

A variation of the direct *gyotaku* technique is evident in two of the installations by the artist Nikolaus Lang (b. 1941) 'Varioota's daydreams after his escape near Aroona Homestead (from Imaginary Figurations, nº. 13)' made in1986-89 and 'Roadkill' made in 1999. Lang's initial interest in Australia began in 1967 when he found a booklet in the Museum of Mankind in London about Australian Aborigines. In 1979 Lang was introduced to Australia through an invitation to participate in the 1979 Biennale of Sydney (Schneider &Wright, 2010). He read about a site in the Flinders Ranges where coloured earth's could be collected and recognised an opportunity to extend his research which began in 1976 in Florence when he collected various coloured pigments from the sites which were used to gather the pigments for old paintings. From 1986 to mid-1989 Lang and his family lived in Adelaide and thereafter he made several visits to Australia. A large body of work evolved from his time spent in Australia, which explored the colonial interaction between Aborigines and Europeans and is invariably connected to the native natural history and its natural or magical interrelations. The territory selected for his fieldwork relating to the 'Varioota's daydreams' installation was a 300 kilometre stretch between Angapena Station and Melrose. The choice of location was determined by an episode in Australia's colonial history.

> "In 1853 or 54 a white shepherd, James Mitchell, was killed by Aborigines in retaliation for the barbaric whipping of indigenous women, children and infants who were drinking at a waterhole. Following a hunt for the killer, two Aboriginal men, Varioota (usually spelt Warrioota or Warranutta) and 'Puttapa Bob' were captured. Varioota escaped but the other man, although badly wounded was made to walk the 300-kilometre journey back to Melrose. He died soon after arrival. A station-hand from Angapena who came to identify the killer said that the body was that of an innocent man" (Art Gallery of S. Australia, n.d).

Lang conducted a series of two to three week road trips across this route where he gathered natural objects such as minerals, pigments, native animal carcasses and plants. The installation 'Varioota's daydreams' consists of paper pulp casts taken from a decaying Red River gum tree and prints made in a similar manner to direct *gyotaku* by applying ink directly onto the surface of the same tree and printing onto large sheets of paper (Lang & Radford, 1988). Due to the size and

weight of the tree it is presumed that the paper was laid on top of the inked tree although this has not been verified.

The installation 'Roadkill' made in 1999 also consists of prints. In this case red ochre collected from the Flinders Ranges was chosen as this pigment because the pigment and the collection site have an underlying significance to Aboriginal people and relates to Lang's realisation of the fatal impact of European settlement. Roughly translated from German in the publication *Das XX Jahrhundert. Ein Jahrhundert Kunst in Deutschland* (Schuster, 1999, p.604). Lang's works is described as:

> "The installation named **Roadkill** (catalogue number 586) in this show deals with the notion of 'objet trouvé' in a particular manner. Thousands of dead animals are to be found on the roadsides of Australia, killed by motorists, mostly at night, but on occasion for sheer pleasure. Virtually all the species are represented from the kangaroo and the dingo to snakes and lizards."

Over a period of several months Lang collected the roadkill which he encountered when driving long distances across South Australia. He then daubed them in red ochre and laid them on panels covered in paper. A panel of negative images was also made in which the dead animals were arranged on the paper panel and red ochre sprayed over them leaving a white 'trace' or silhouette of their bodies. The installation is designed to be wall mounted and measures 330 cm in height by 3150 cm width (Lang, 2001).

The artist Julian Meredith (b. 1952) has employed similar printing techniques to those used by Nikolaus Lang in his installations and to Dali's squid/octopus images on paper, in the production of his prints from genuine specimens. One example of his work titled 'Pike' is part of the Victoria and Albert museum collection in London. It is described as: "two prints of a pike, lengthways, one above the other, in layered colours of predominantly sea green, with grey-brown and some yellow." This was printed by the artist in 1989 and:

> "… was produced by applying paint to a dead pike and using this as a 'block'. Paper is then lowered onto the block and hand burnished using a metal spoon" (Meredith, 1989).

Burnishing with the convex side of a metal or wooden spoon is a technique often used to hand print relief blocks. 'Pike' is held in the Prints, Drawings and Paintings Collection of the Victoria and Albert Museum, London. However, Meredith uses a variety of animals, birds, insects and fishes which have been donated to him or he finds already dead as 'roadkill' or when beach combing. Meredith proclaims:

> "The prints that I do from fish bird and animal are usually done on heavier paper than my woodcuts and are not finely printed, they are produced in a similar fashion to the work of Yves Klein who is an artist that I respect. I cannot explain very well, what it is that I am trying to do. I use sekishu shi for woodcuts and for stencils and sometimes for mono prints. I make my own gouache to print with by the bucket full as I want bigger things, there is a deer and an otter on my Newcastle blog" (Personal communication, October 19, 2009).

In fact, Meredith acknowledges the importance of scale in his work and explained that the reduction of images to a small scale is part of the reason why many people ignore images or that the images have a reduced impact upon the viewer. Meredith's artist in residency as part of the 2009 Northern Print Biennale enabled him to create a large-scale art work of a blue whale in which visitors could watch him printing and displaying the work in the Great Hall of the Discovery Museum in Newcastle upon Tyne. 'Blue Whale' was created from twenty five planks of an elm tree measuring five metres vertically by one meter horizontally. Visitors could also contribute to another work by the artist reflecting the River Tyne and the fishing industry. An outline of a whale was drawn onto a roll of fabric and visitors were asked to make an image of a fish using a mud resist paint. The work was later dyed a rich indigo blue colour leaving the fish shapes white. Meredith remarks:

> "Also on show in the Great Hall are prints made on paper directly from the bodies of dead creatures found near his rural home. There are swans, otters and deer which, says Julian was later consumed. We carved it up and ate it at a party. It filled about 50 people" (Whetstone, 2009, ¶ 18).

The prints made from the 'bodies of dead creatures' are produced in the direct *gyotaku* technique and although Meredith is aware of *gyotaku* his works are often labelled as 'mono prints' in various galleries, collections and exhibitions.

In Meredith's work titled 'Augury' (migration), a slightly different approach was taken and the inked fishes were placed on top of the papers (Figure 77). This work was commissioned for the 'Fleet: Art from the Haven Ports' project and linked the art work with the Stour estuary and its seasonal patterns. From autumn 2009 until the summer 2010 'Augury' was exhibited in the unusual venue of Mistley Towers, in Essex. The two Georgian towers are the remains of an unconventional design for a church by Robert Adam in 1776.

Figure 77 - Julian Meredith printing an inked fish for his work 'Augury'. Photo courtesy of www.julianmeredith.co.uk

Another artist who is aware of the *gyotaku* technique and has employed this in her work is Victòria Rabal (b. 1958). Rabal graduated from the University of Barcelona with a degree in fine arts specialising in painting and printmaking and graduated in art history from the Autonomous University of Barcelona. Recognised as an expert in paper, Rabal is the director of the Paper Mill Museum Capellades in Spain and teaches and lectures on this subject across the world. She was awarded the 'Paper Master Diploma of the Catalan Government' in 2008. Rabal has had numerous solo and group exhibitions and her work is represented by the N2 gallery in Barcelona. Fishes, aquatic life forms, fishing nets, boats and the sea are recurring themes in Rabal's two and three

dimensional works which includes paintings, prints, artists books, and hand-made paper installations. Her series 'Anguiles' (eels) features photographic images, printed images, mixed techniques on hand-made paper and an artist's book, 'Eels' the artist book made in 2009 is a limited edition of twenty five, containing paper pulp images, screen prints, a poem in watermark by Richard Schweid and transcriptions in English, Spanish and Catalan. Rabal comments on this fascination with fishes in (Personal communication, August 17, 2012). "My father liked to fish but he was a silversmith.....and the fishes look as a silver sculptures..." Rabal's *gyotaku* project '*Gyotaku:* capturar l'anima dels peixos' (*Gyotaku*: capturing the spirit of the fish) a creative and participatory project began in October 2010 and the first part was concluded in December 2011. Rabal explains:

> "It involves the creation of an atlas of the fish sold in the Central Fish Market in Barcelona using the traditional Japanese *gyotaku* technique. For over a year I went down to the market in the early morning. In line with the list of species sold there I chose the fish I was interested in and made prints of them under the curious gaze of the public" (Personal communication, August 16, 2012).

The site of the Mercabarna Central Fish Market in Barcelona covers twenty four thousand meters, employs fifty two wholesalers and approximately one thousand five hundred retailers, it has eighty rooms equipped for the handling and preparation of fish and shellfish. Everyday Rabal set up a work table at approximately 4:00 am or 4:30 am and prepared her materials. She would then visit the different fish stalls with the Director of the Market Mr. Daniel Martinez. Fishes and molluscs were chosen by Rabal depending on what was available on any particular day. The majority of the fishes were purchased at wholesale prices and others were given to her as a gift from the stall holders who in return revived a *gyotaku* of their donated fishes. Each specimen was used to create a minimum of seven direct *gyotaku* prints on a selection of *Kozo Gampi* and *Mitsumata* hand-made Japanese papers measuring 140 x 70 cm, 98 x 68 cm and 47 x 75 cm. Each *gyotaku* was printed using black Chinese ink and numbered and signed by the artist. The papers were made by three different Master paper makers Shingo Nishimura, Norito Hasehawa and Tsuyoshi Nakahara from the town of Aoya located in the Ketaka district in the Tottori prefecture, Japan. Rabal's written and

photographic records of her project verify that seventy two specimens were printed (Figure 78). A selection of *gyotaku*'s from *Gyotaku*: *capturar l'anima dels peixos* (*Gyotaku*: capturing the spirit of the fish) was exhibited at the Directions Center of the Mercabarna from 16th December 2011 until the 20 January 2012. The exhibition was accompanied by a hand-made artist's book as discussed in chapter two.

Figure 78 - Victòria Rabal at work in the Mercabarna Central Fish Market, Barcelona. Image courtesy of Victòria Rabal.

During the project Rabal was filmed by the Catalan television channel TV3, Mediambient and the French television company Thalassa TV planned to make a program for their weekly series 'All About the Sea'. The spring edition of 'Eikyô' magazine (Sariz, 2012, pp.14-15) featured one of Rabal's *gyotaku* on its front cover and an article inside the magazine and online presented her *gyotaku* project. The *gyotaku* project was later exhibited in the Space Carte D'art Shows, Piazza Manganelli Palace Manganelli in Catania, Italy for the months of November and December, 2012. Further *gyotaku*'s were displayed as part of Rabal's show curated by Pedro Roth at the Fundación Pasaje 865 in Buenos Aires, Argentina which opened in October 2013. Rabal wrote: "I never could imagine all this when I started my *gyotaku*...and I'm very happy to make all these

connections...thinking that it is true that Art makes Life more interesting than Art" (Personal communication, August 17, 2012).

Some of the artists discussed in this chapter are fully aware of *gyotaku* and others are not. However, they are technically skilled or knowledgeable about other types of printmaking and mark making techniques and materials. Perhaps it is these attributes which have led them to include *gyotaku* in their works and working with this technique is a natural extension of their practice. Although the artists discussed in this chapter are all connected to each other by their use of *gyotaku* or a variation of the *gyotaku* technique the contextual input of their work and the finished results are very different. In many instances they deal with the traces or elements of something left behind whether this is a tangible object and /or a feeling (Figure 79). In the act of creating *gyotaku* they have created a permanent, life size record which has taken on a greater significance. Silvia Freiles has summed up some underlying ideas which are perhaps relevant to all of the artists discussed when she refers to Victòria Rabal's work on the exhibition invite for Rabal's show in Catania, Italy:

> "By placing sheets of paper on fish and shellfish of different sizes and imprinting the shape, Victòria Rabal through a sort of "taxation" in the original sense of the hands to "put over", officiates the sacramental rite that transforms death in to life, the ephemeral to imperishable, the self itself in me for the other, nature in art" (Personal communication, November 24, 2012).

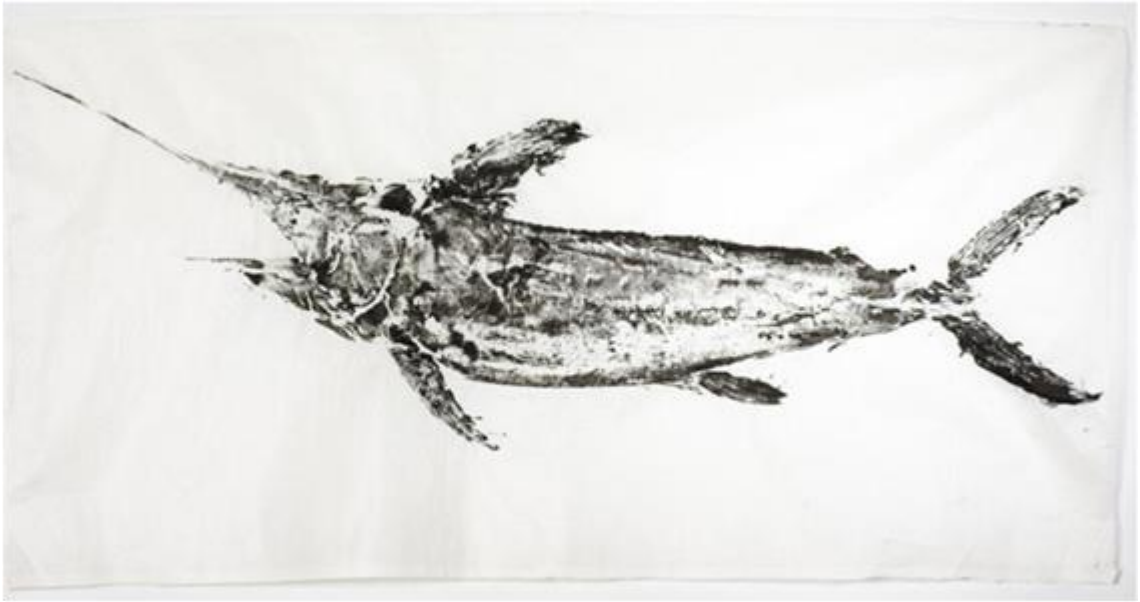

Figure 79 - Swordfish direct *gyotaku* by Victòria Rabal. Photo courtesy of Victòria Rabal.

5.3. *Gyotaku* Masters and Practitioners

'Printmaker' is a generally accepted term used to describe an artist who makes their own prints or works of art using some form of printing process. *Gyotaku* and nature printing practitioners can be classified as 'printmakers'. The term 'master printer' or 'master printmaker' is a highly skilled crafts person who assists and collaborates with an artist to produce a limited edition of prints or in some instances a unique print. In the United Kingdom during the 1940's the term 'master printer' was given to the person who owned a printing company (these were generally small establishments) and who was a member of the British Federation of Master Printers[37].

However, the term 'master' has a different connotation in Japan. When referring to the arts it is often associated with gruelling apprenticeships lasting for many years and hard physical labour or working conditions such as those found in traditional Japanese paper making. An extensive tradition of handicrafts and arts exist in Japan in which the transmission of skills and knowledge comes from experts with practical, and tacit knowledge. This may be passed on from family member to family member or from teacher (*sensei*) to student, or from master to apprentice. The honorific title of 'master' may be given to a person in recognition of their level of expertise such as master Boshu Nagase, the *gyotaku* artist, or it may be a title conferred by the Japanese government to individuals recognised for their cultural achievements and intangible cultural value in Japan, often called National Living Treasures[38]. At present there are no Japanese *gyotaku* masters who have been awarded the title of National Living Treasure by the Japanese government.

37 The Federation of Master Printers and Allied Trades of the United Kingdom of Great Britain and Ireland was founded in April, 1901. In June, 1931 the Federation changed its name to the British Federation of Master Printers. The name changed again in 1974 to the British Printing Industries Federation, as it is currently known.

38 National Living National Treasure's an informal Japanese term conferred by the government to individuals recognised for their cultural achievements and the preservation of their skills and knowledge.

The word *sensei* means teacher, master, or ancient sage and is often used today in the West as a term of respect when referring to people of any nationality who teach martial arts or to Japanese people who teach a variety of subjects including visual or performing arts and *gyotaku.*

In feudal Japan persons involved in the mercantile, handicraft, and performing arts professions formed groups or guilds which were generically called *za.* These were often formed and maintained under the patronage of noble families, or the *zasu* the head priests of Buddhist temples or Shinto Shrines, or were formed by groups of people with the same trade such as carpenters, musicians, and metal workers. This influence of this tradition can still be seen in modern Japan as many of the performers of *kabuki* and *noh* theatre belong to associations called *za,* for example *Kabuki-za.* The members of the guilds ensured that the specialist skills and knowledge inherent in their professions would continue and be handed down to future generation (Gordon, 2003). This was generally facilitated through the master and apprentice system. The term 'master' denotes a person with a recognised and disciplined development of specific skills who is considered an expert in their field. Apprentices undergo several years of training and practice before they perfect their art / craft and may eventually become 'masters' in their own right. A number of new schools have emerged in Japan that offer an alternative to the historical apprenticeship system. Future generations of craftsmen are cultivated within the framework of the modern educational system.

> "One example is the Esperanza Institute of Footwear Design and Technique in Tokyo's Taito Ward, where 36 students per year learn the shoemaking trade in a two-year program following a modern-style curriculum. When it first opened, the academy limited admission to cobblers' apprentices but in 1993 it opened its doors to the general public, and since then, the number of applicants has skyrocketed" (Anon., 2003).

In the traditional master and apprentice style of learning the *gyotaku* master Misaki-jin Taniguchi accepted Emmanuel Boke from France as his student. Boke had discovered Taniguchi's work during an Internet search and was captivated and intrigued by the images and wanted to study the *gyotaku* technique at any cost. Although Boke speaks French and English Taniguchi does not speak any French and is not fluent in English and was understandably concerned about how much

Boke would be able to learn. However, a lack of a common language did not present a problem and Boke arrived in Japan in January 2009 to study colour *gyotaku* (Figure 80). Taniguchi stated:

> "My home page is made in Japanese, but when going through a translation site, even English is indicated. It's surprised by these days' internet spread, but fortunately. I'm also very happy that a Japanese fish print started to be learned internationally" (Taniguchi, 2009 ¶5).

Obviously, Taniguchi's text has been translated automatically by a computer, even so this does not interfere with the overall meaning and it is easy to follow the entry on his website with the title 'The becoming a pupil visit to Japan which is fish print guide from France!', which outlines in text and images Boke's *gyotaku* achievements with two weeks of intensive study under Taniguchi.

Figure 80 - Emmanuel Boke from France, learning direct colour *gyotaku* at Taniguchi's studio in Japan, 2009. Image courtesy of http://www.khojin.jp

Taniguchi was born in 1949 in Kushimoto, a coastal town in the Wakayama Prefecture which has the distinction of being the most southerly point on the principal Japanese island of Honshu. The coastal area is particularly rocky and well-known to anglers as a good fishing location. In 1976 he started printing in the direct *gyotaku* method and in 1977 he joined the group *Kai Tak*

'positive oriental fish print'. Taniguchi has exhibited his works widely in Japan in both group and one person shows. He has also won many awards for his *gyotaku* images, and has demonstrated his techniques to a wide audience, and provided numerous workshops and lectures concerning *gyotaku*. Taniguchi is the representative of the *Yumizu gyotaku* group who are dedicated to the spread of colour *gyotaku* art through the realisation of exhibitions and workshops.

Osaka's Kaiyukan Aquarium held an exhibition titled 'Wonderful Aquarium Prints' prepared by the *gyotaku* artist Aisei Moriyama and members of the *Yumizu* group in the Kaiyun Satellite Gallery of the Tempozan Marketplace from February to March 2012. Over thirty unique coloured direct *gyotaku* prints were displayed including flying fish (Figure 81) and scorpion fish which are both difficult fishes to print. To encourage the spread of the direct *gyotaku* technique in full colour a T-shirt printing workshop was held for members of the public and a gallery talk explaining the direct *gyotaku* process and the *gyotaku* prints on display.

However, perhaps the most well-known masters of *gyotaku* in the west are Kouyou Inada (sometimes spelt Koyo) who introduced both the indirect and colour *gyotaku* in the 1940's, and his former student Boshu Nagase, who is an internationally acclaimed *gyotaku* expert. Nagase developed his own style of full colour indirect *gyotaku* and is himself recognised as a master. Skilled in printing a range of subjects, he sometimes adds edible plants, or woven bamboo baskets, to his aquatic compositions.

Figure 81 - Direct *gyotaku* in full colour of flying fish from the Kaiyukan Aquarium exhibition held in 2012. Image courtesy of www.kaiyukan.com

Nagase has taught *gyotaku* to numerous people in Japan and one of his students Erika Reichenbach explained her learning experience:

> "Lessons stated at 8:00 after breakfast. Nagase-sensei was silent but provided me with a diagram or a drawing of the fish with finger tipped dots typically of nine different colours. The fish was prepared and ready for printing on my desk next. We worked until 12:30, had lunch, and then started fish printing again. At 6:00 pm it was time for a hot Japanese bath, followed by dinner, and afterwards another two hours of work. After a few days I felt completely exhausted, until I realized that the old man, my kind teacher, got up every night at 4:00 am to receive one or two fresh fishes from a friend. Boshu prepared them for me and made diagrams with the coloured dots so that I could understand the character of the fish. For each fish he added the Japanese name and the body of water where it was caught – all in capital Roman letters. After one week, he showed me how to clean and prepare the fish for printing. I had to select the colours for each fish, make the 'bed' of clay, and cut the masks myself" (Reichenbach, E. 2007, p.7).

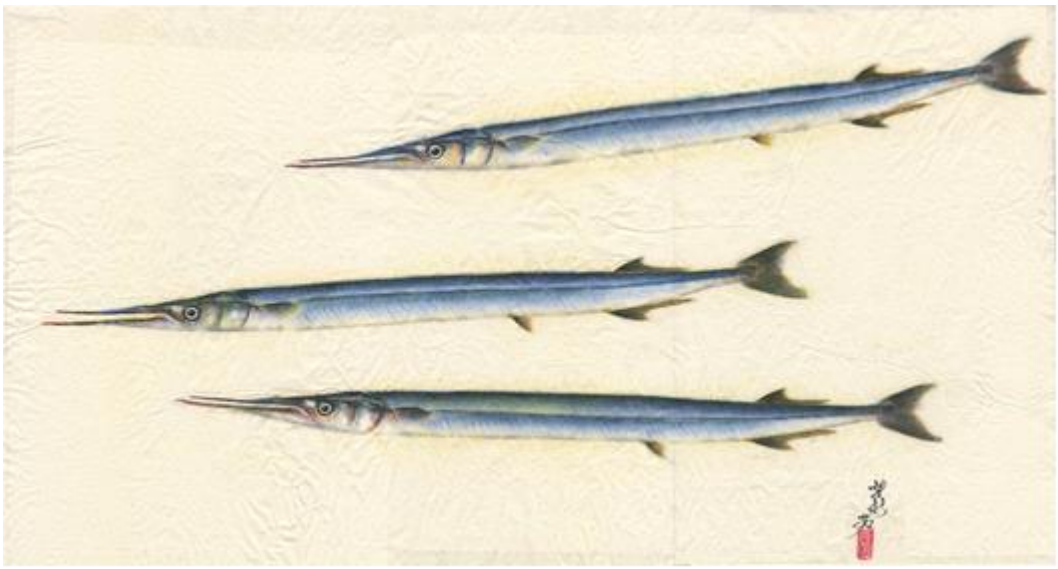

Figure 82 - Boshu Nagase indirect *gyotaku* of *Belone belone*. 100 x 68 cm Image courtesy of © Oceanographic Museum Monaco.

Examples of Nagase's *gyotaku* can be found in books such as 'Antarctic Fishes' with text by Mitsuo Fukuchi and Harvey J. Marchant and in a number of collections including; the Musée Oceanographique Monaco (Figure 82), the Australian Antarctic Division, and the University of Maine, USA.

Like Boshu Nagase, Mineo Ryuka Yamamoto is a 'Lifetime Member' of the Nature Printing Society. He has studied and worked with printmakers in Japan, Canada, China, Europe, New Zealand, Australia, and the USA. Stephen DiCerbo (2012, p.1) explains:

> "Since 1973 he has taught thousands of people the art of fish and nature printing, often at NPS gatherings. Many NPS members think of Mineo as their mentor, their *sensei."*

Yamamoto's interest in fishing and the arts led him to practising direct *gyotaku* often catching, printing, and then cleaning, cooking, and eating the fishes and other edible specimens. DiCerbo states in an article titled 'Ichthyology Meets Printmaking':

> "Several years later, he happened upon a demonstration of *Kansetsu-ho* fish printing at a boat show. He stayed at the demonstration table for three hours, intrigued by the beauty of colour and detail that could be attained with the Indirect method of *Gyotaku*. Struck by Mineo's obvious intense interest in the printing method, one of the artists asked him if he would like to study the method as a member of the Sea Horse *Gyotaku* Club. Under the tutelage of Mr. Ryuzaburo Takao, Mineo studied *Kansetsu-ho* or the indirect method for the next seven years. At the end of this apprenticeship, he was awarded a

> diploma and given his Artist's name – Ryu, which means dragon (seahorse). He then became a teacher at the sea horse club for three years. At the age of 40, he established his own *Gyotaku* club which he named 'The International Fish Print Studio'" (Monoyios, 2011, n. p.).

Yamamoto is a member of the IGFA (International Game Fish Association) and like the majority of *gyotaku* printmakers he has a respect for nature and practises catch and release fishing. The botanical specimens for *gyotaku* are usually grown by Yamamoto in his garden.

Recently, Yamamoto has provided one week intensive *gyotaku* courses for small groups of international students at his Fish Print Studio based in Higashimatsuyama in the Saitama Prefecture, Japan. This course includes a visit to a traditional Japanese hand made paper making studio and the opportunity for students to make their own paper. Also, he is available for private lessons which last for approximately seven hours. As a regular instructor at the Annual Nature Printing Society he has shared his *gyotaku* innovations such as the three dimensional mounting of *gyotaku* prints. This process involves printing a fish in the indirect method and then forming clay into the same shape and size of the original fish. This clay form is placed under the dried print then both are wet mounted in the traditional Japanese method which allows the print to take on the three dimensional form of the fish. Yamamoto also produces his own range of oil based inks suitable for printing on fabric in the indirect method. In 1998 Yamamoto's instructional fish print book in Japanese was published by the Kyoto Shoin Publishers, this contains a step by step guide about how to create your own *gyotaku* prints and features many images and photos of various fishes (Personal communication, August 12, 2011).

In 2007 Yamamoto directed the creation of a one hundred meter long *gyotaku* art work. Over two hundred visitors to the Shanghai Ocean Aquarium in China were involved in the project in which thousands of scallops shells were *gyotaku* printed on to rolls of fabric for a Guinness World Record challenge.

The Japanese *gyotaku* masters discussed in this section have spent several years as an apprentice perfecting their skills under the instruction and mentoring of a master and are members of *gyotaku* associations or clubs. Over time they have developed their own particular techniques, aesthetic styles or as in the case of Yamamoto have developed their own materials such as his oil based inks. However, the skills and knowledge that the *gyotaku* masters have acquired over many years of study and practice are not kept secret and guarded by a guild system. In fact the *gyotaku* masters all share the common desire to spread *gyotaku* techniques across the world and pass on their skills and knowledge to anyone who wishes to learn. Evidently, language has not proved an obstacle to their motivation.

5.4. Illustrators and Graphic Designers

The familiar iconography of *gyotaku* was used by a team of designers when working for the advertising agency McCann Erikson Japan Inc. for a poster and billboard campaign. The art director/creative director Masaki Shibuya, the illustrator Yoshifumi Uemi, and the photographer Takashi Suzuki, presented a humorous rendition of *gyotaku* for their client the Fukuske Corporation and their advertising campaign for Fukuske tights and stockings. The Fukuske brand of tights and stockings had a traditional and rather old fashioned image in Japan. It was the aim of the advertising campaign to modernise the Fukuske image and to instil the idea that wearing Fukuske tights and stockings was fashionable and fun. The design was a great success and won the prestigious Art Directors Club 'distinctive merit award'. Founded in 1920 and based in Manhattan, New York, the Art Directors Club is the premiere international organisation of creative professionals and associates. The Art Directors Annual honours the year's best work in the communication arts for visual innovation and excellence including; advertising, graphic design, interactive media, photography, and illustration. Revealing the creative process behind the campaign McCann Erikson Japan Inc. stated in the *Art Director Club Annual 87* (Art Directors Club, 2009, p.147):

"Our idea here was to turn traditional into a positive by featuring a method used in *gyotaku* or traditional Japanese fish-print-art. Likening women wearing Fukuske stockings to beautiful fish that swim in the city. We took imprints of their shapely legs covered in beautifully patterned stockings by Fukuske. The resulting prints were in effect modern art, thereby presenting the brand as being international, contemporary and fashionable. As advertising copy we inscribed the names of stylish towns in Japan (Shibuya, Ginza, Rippongi) along with the time in which these fish were caught to add an element of humour. The overall intent was to communicate the brand as exciting and relevant to young women."

The black printed images on a plain backgrounds have the appearance of a 'trophy print' or record made by fishermen, the only visible colour is that of the Fukuske logo which is visible in the bottom right hand corner similar to a signature seal or *hanko.* To appear more fish like a black and white eye has been added (Figure 83, Figure 84 and Figure 85). It is interesting to note that the advertising copy mimics some of the information which would be recorded by sports fishermen and written nearby the *gyotaku* image.

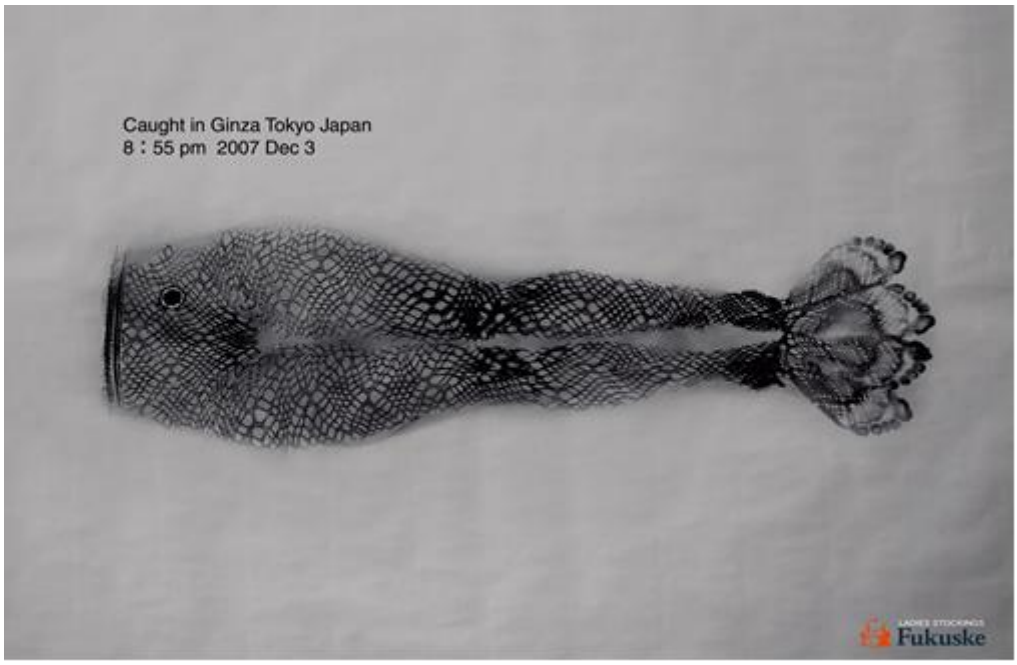

Figure 83 - Title: A Fish Print (2008) Ginza. Client: Fukuske Corporation. Advertising Agency: McCann Erikson Japan Inc. Creative Director / Art Director: Masaki Shibuya. Image courtesy of McCann Erikson Japan Inc.

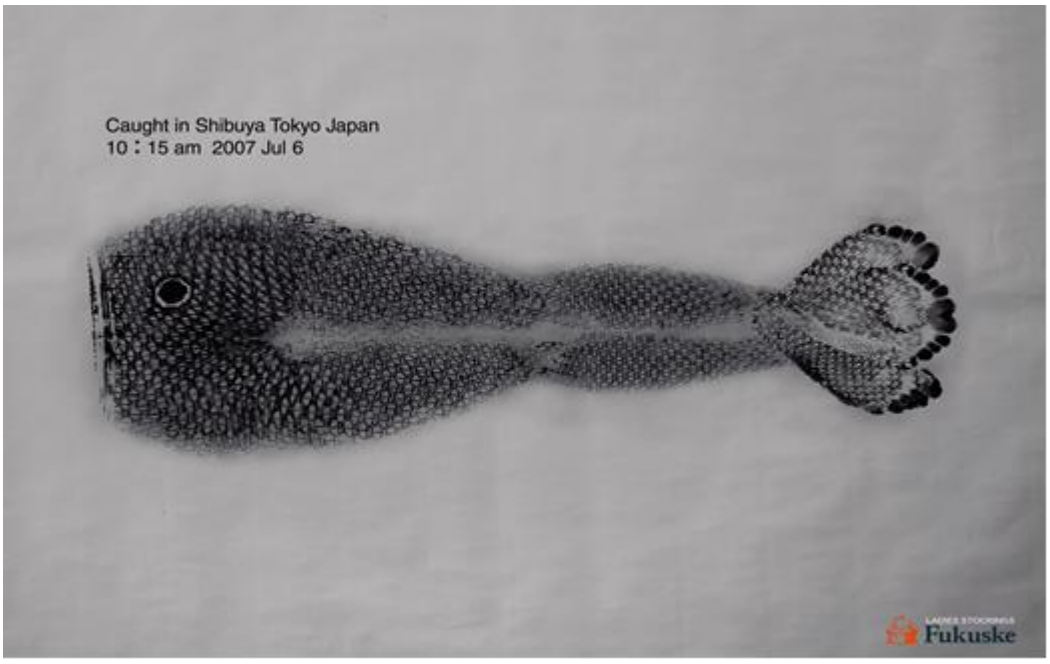

Figure 84 - Title: A Fish Print (2008) Shibuya. Client: Fukuske Corporation. Advertising Agency: McCann Erikson Japan Inc. Creative Director/ Art Director: Masaki Shibuya. Image courtesy of McCann Erikson Japan Inc.

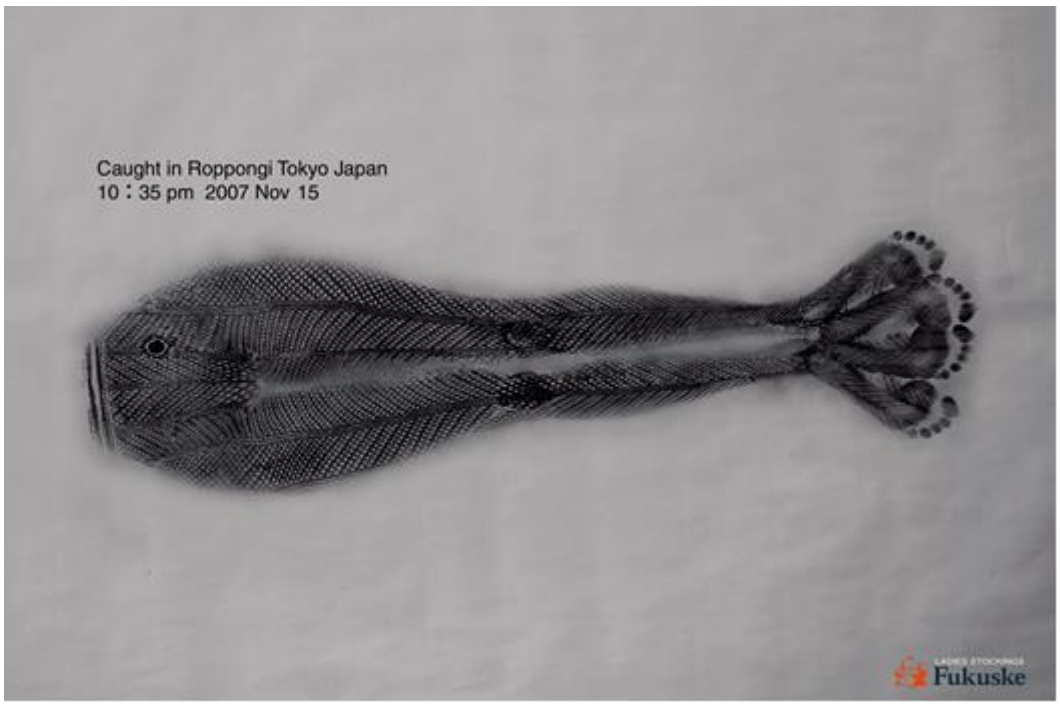

Figure 85 - Title: A Fish Print (2008) Roppongi. Client: Fukuske Corporation. Advertising Agency: McCann Erikson, Japan Inc. Creative Director/Art Director: Masaki Shibuya. Image courtesy of McCann Erickson Japan Inc.

Although the *gyotaku* images were specifically created by the team at McCann Erikson Japan Inc. for their client the Fukuske Corporation an equally well-known and established brand in the USA did not employ an advertising agency but sourced an image which had already been created, by the artist Annie Sessler. 'Red Lobster' is a renowned chain of seafood restaurant across the USA and Canada. The first Red Lobster seafood restaurant was founded by Bill Darden and opened in 1968 in Lakeland, Florida and is now a division of Darden Restaurants. The company has a reputation for fresh seafood served in a casual dining atmosphere. Today there are more than seven hundred Red Lobster locations throughout the USA and Canada. The company chose a direct *gyotaku* image printed in red ink of a Lobster created by Annie Sessler for their menu design. Sessler also features in a short film for the Red Lobster advertising campaign 'See Food Differently' created by Grey New York part of the Grey unit of the Grey group owned by WPP[39].

Figure 86 - Red lobster menu featuring Annie Sessler's direct *gyotaku*. Image courtesy of Annie Sessler.

39 WPP Stems from the foundation company 'Wire and Plastic Products'. Today WPP is the world's largest communications services group working in three thousand offices in one hundred and ten countries.

The theme of the campaign is focused on the workers who help to bring Red Lobster fare and products to its customers. Actors are not used and real people are filmed talking about their work and role in the Red Lobster company including; a crab fisherman in Alaska, a wood-grill chef in the Bronx, and the artist Annie Sessler with her *gyotaku* image for the menu design (Figure 86).

Sessler's husband Jim Goldberg is a fisherman and he showed Sessler how to make a direct *gyotaku*. At that time Sessler had no idea that she was creating a *gyotaku*, but because she had studied graphic arts, including printmaking at Stanford University, she realised that the experiment offered great potential. Together they formed East End Fish Prints and in 2006 they began to sell Sessler's *gyotaku*. Martin Brett (Aug. 8, 2007, p.9) posited in an article in the New York Times that "It's an elegant hunter-gatherer arrangement: he catches the fish; she prints the fish; then, together, they eat the fish." Sessler participates in approximately fifteen to twenty arts and crafts shows every year and organises visits to view her work at her home studio in Montauk, the East End of Long Island, New York. It was during an art fair in Montauk that Captain Paul Stern a commercial fisherman met Sessler and discussed the idea of printing a Tuna. The Blue-fin Tuna which Captain Stern customarily caught were enormous so Sessler asked him for a smaller one which she thought would be of a more manageable size for printing. Russell Drumm (Sept. 29, 2009) reported that:

> "On Sept. 20, she got the call. Captain Stern had caught what he called 'one of the smallest of these (Blue-fin giants) I've ever caught, a 400 pounder'. The fish was landed at the Montauk Fish Dock. Paul Farnham, the proprietor, offered the facility's large, and very cold, cooler to work in. The fish was to be sold the next day, so the printmaking had to be done in thermal clothing despite the summery weather outside"

Since producing a successful large scale *gyotaku* of the bluefin tuna, Sessler has considered attending some of the larger fishing tournaments in order to sell her work and perhaps gain the opportunity to print a fisherman's prize catch. Original *gyotaku* are printed by Sessler with water soluble non-toxic inks onto a variety of substrates including; vintage fabrics, recycled papers, Japanese papers and new natural and synthetic fabrics. Explaining her *gyotaku* practice Sessler states:

> "It feels very natural and right for me. I love making things with my hands, I love nature and I love learning about fish and different species, it's all tied together. I feel it's very important to value the creature that I'm working with. I feel a great deal of respect for the fish, I don't take them lightly just as an object I'm using for art or craft. I feel a certain reverence to the creatures. Each fish you do, you learn about each one. To look at the elaborate surface pattern of the shell of a lobster was fascinating, all these textures, and ridges, and things like this, you don't even notice usually. I studied art in college and it allows my passion to be expressed – you know – my love of life, love of the sea, and love of fish, come out, and it's a very close and personal relationship, from catching them, to rubbing them, to having dinner. It's a basic but satisfactory experience. When I first started doing this I had no idea where this was going to lead. Never did I expect this wonderful surprise of getting to work with Red Lobster. It's an amazing opportunity and I feel thrilled that they chose my art work. I have a great desire to share my love of fish with the world and Red Lobster are already doing that" (Jmattyb13, 2011).

Sessler's work has also started to gain a number of collectors. An example is Alexa Van de Walle and her husband, Henry Owsley. The couple saw some of Sessler's *gyotaku* at an art fair in Southampton, New York and immediately purchased eight fish images of Sessler's *gyotaku* for the dining room of their summer house. The couple now own eleven of Sessler's original *gyotaku*'s Van de Walle explained the attraction "There's something wonderful about how organic they are - how they're truly something from nature" (Brett, M., Aug. 8, 2007, p.9).

Sessler's lobster image in red is a perfect match for the Red Lobster seafood restaurants because the shell of the lobsters only turns red when cooked. A naturally occurring carotenoid pigment called astaxanthin is present in all Lobster shells and it is stable in heat. Therefore, when the lobster is cooked the other pigments in the shell break down leaving the bright red astaxanthin..

Although Sessler professes her love of fish the artist Jake Tilson (b. 1958) admitted that he has been scared of fish for as long as he can remember. He declared "Rather than resorting to the analyst's chair I hope to cook my way out of my problem" (Tilson, 2011, p.7). Tilson is an artist, designer, author and publisher based in London. He has contributed to magazines such as Food & Wine USA, Saveur, Creative Review and Blueprint and has reported on sustainable fishing for the BBC Radio 4's Food Programme. Tilson's art work is greatly influenced by fish, the paraphernalia of fishing, seafood packaging, the cooking and consumption of seafood and a genuine concern for marine conservation. His resolution to embrace seafood cooking as a means to overcome his

childhood fear of sharks and eating fish led to his book *In at the Deep End.* This publication not only provides seafood recipes but is an example of Tilson's artistic output, every aspect of the photography, typography, collages, prints, illustrations, and text were created by him. Throughout the book there are examples of fish based art works which have been exhibited in art galleries and design events such as his project "*A Net of Eels* a three year exploration of the complex cultural and culinary significance of the eels in Japan and the UK" (Tilson, 2011, p.199) which is now part of the Tate Gallery Collection, London. Tilson writes about; his cooking and dining experiences during his travels to Venice, Sweden, Scotland, New York City, Sydney Australia and the Great Barrier Reef, Tokyo, London, and the fishing towns of Southeast England accompanied by his personal journey and experiences of overcoming his fear of fish. There is a single direct *gyotaku* illustration of a rainbow trout on page 186 of the book (Figure 87). Tilson explains: "I learnt about the process when researching fishing techniques in Japan, I was interested that rather than take a photograph of a caught fish a fisherman would take a print" (personal communication, February, 13, 2013). On the opposite page there is information about rainbow trout, a very brief explanation of *gyotaku*, and the recipe for *Yakimono* rainbow trout. The meaning of the Japanese word *Yakimono* is 'broiled things' and can refer to grilled or pan fried foods. *Yakimono* is the fundamental way of cooking fish in Japan but can also be used for meat and some vegetables. Descriptions of badly printed *gyotaku* in which it is not possible to identify the species of the fishes or other specimens use a word which refers to one of the ways in which a fish could be cooked. The term *sumi-yaki* is used for badly printed *gyotaku* which means "fish over baked and burnt as if turned to charcoal" (Hiyama, 1964, p.9). *Sumi-yaki* are frequently the outcome of first attempts at direct *gyotaku*. Tilson remarked "printing from fish is difficult" (personal communication, February 13, 2013) (Figure 87). It remains to be seen how Tilson will utilise his newly acquired *gyotaku* skills as he plans to use the technique in some of his future art works.

Figure 87 - Figure – 87 Left: direct *gyotaku* of a rainbow trout as it appears on page 186 of the book In at the Deep End. Right: 'Seconds' direct *gyotaku*'s hanging on the wall of Jake Tilson's studio in London. Images courtesy of Jake Tilson.

The award winning illustrator S. D. Schindler chose it to illustrate the endpapers of Mark Kurlansky's book *A Cod's Tale* (Kurlansky, 2001) using the *gyotaku* technique. During his childhood Schindler developed a passion for drawing and an interest in animals and kept a variety of pets. Although he majored in biology at University he sustained his passion for drawing and even sold some of his artwork in outdoor shows during the summer holidays. As an adult Schindler still keeps pets, his cats have been the inspiration for some of his illustrations in books such as *Cat Dreams* by Ursula K. Le Guin and *Whittington* by Alan Armstrong. It took Schindler several years to have his illustrations accepted by an agent, after which he began to work on children's books. In 1982 his first book was published *The First Tulips in Holland,* written by Phyllis Krasilovsky.

Subsequently, this book won the 'Parents' Choice Award for Illustration' from the Parents' Choice Foundation in 1982. Today Schindler is well known for his pen and ink, gouache, and watercolour illustrations created for a range of children's books which include; *Don't Fidget a Feather!* which won the Bank Street College 'Best Children's Book Of the Year Award' (age five to eight category) in 1998, *How Santa Got His Job* which won the America Library Association's 'Notable Children's Book Designation in 1999 and *If You Should Hear a Honey Guide* which won both the 'Smithsonian Award for Natural History Title' in 1995 and the 'California Young Reader Medal' in 1996-1997. However, instead of pen and ink Schindler used *gyotaku* to illustrate the end papers of *The Cod's Tale* written by Mark Kurlansky. Schindler gives thanks and an explanation in the dedication:

> "For the endpapers, special thanks to my brother, Thomas Schindler, for his instruction on *gyotaku*, a Japanese fish-printing method used to record the size of a fisherman's catch. In this book the print was made with gouache on rice paper using a whole cod as a template. The rest of the art was done in watercolour and inks, on watercolour paper" (Kurlansky, 2001, p.4).

It appears that this is a unique image by Schindler as *gyotaku* is not part of his oeuvre.

An illustrator working with *gyotaku* for the purpose of natural history illustration and art is Stephen DiCerbo. He graduated with a Bachelor of Science in Science Illustration from Sage College of Albany, New York. Since 1975 he has worked as a freelance artist and illustrator and is the founder and owner of Storm Tree Studio in North Hudson, New York. A multi-talented natural history illustrator DiCerbo creates works using a range of traditional mediums and software programmes e.g. Photoshop and Illustrator. Printmaking is also part of his oeuvre and he utilises both the direct and indirect *gyotaku* techniques with a variety of inks, papers, and fabrics. The unusual aspect of a number of DiCerbo's works is that he combines his *gyotaku* images and in-depth knowledge of fish with his computer skills in Photoshop and Illustrator. The use of these particular computer programs enables DiCerbo to manipulate and duplicate original *gyotaku* in order to compose realistic shoals of fishes without the need of creating multiple *gyotaku*'s (Figure 88). Although the manipulation of original photographs, prints and drawings with various computer

programs is a common method of creating illustrations it is unusual to use *gyotaku* as the original source material.

Figure 88 - A shoal of crevalle jacks, *Caranx hippos* created by Stephen DiCerbo using original direct *gyotaku* prints and Photoshop software. Photo courtesy of Stephen DiCerbo.

An avid fisherman and enthusiastic cook DiCerbo generally prints and cooks the edible specimens from his fishing trips or places them in the freezer to use at a later date. Perfecting his art of *gyotaku* for nearly twenty years he has passed on his knowledge by teaching and participating in numerous workshops including those at the New York State Museum, the Annual Nature Printing Society Workshop and the Conference and Annual Meeting of the Guild of Natural Science Illustrators (GNSI), of which he is a member, also to students at various High Schools and community arts centres throughout the USA. His work has been exhibited widely in the USA and has been accepted at a number of juried exhibitions including; the 'GNSI Eye on Science' at Port Kent, Maine in 2009, 'Focus on Nature' held at the New York State Museum and the 'Wildlife Art Show' at the Fulton Street Art Gallery, New York City. Examples of DiCerbo's illustrations can be

found on T-shirts, greetings cards, calendars and in various publications including; *Exploring Wisconsin Trout Stream: the Angler's Guide* by the authors Steve Born, Bill Sonzogin, Jeff Meyers and Andy Morton, the fourth edition of *Ornamental Horticulture. Science, Operations and Management* by the author Jack E. Ingles, *Plant and Soil Science: Fundamentals and Applications* and *Introduction to Plant Science* both by the author Rick Parker. DiCerbo's *gyotaku* art work has featured on the cover of the magazine *Mid Atlantic Fly Fishing Guide* and is described as:

> "'Marauder' by up-state New York fish and wildlife artist and illustrator Stephen DiCerbo is a depiction of a school of Bluefish *Pomatomus saltatrix.* It was rendered with the Japanese direct fish printing (*Gyotaku*) technique known as *Chokusetsu-ho*. This particular piece was created using transparent and opaque inks on an oriental paper called Thai Unryu" (O'Brien, 2004, p.3).

The fish were caught by DiCerbo South of Morris Island, in Cape Cod, USA. As a long-time member of the GNSI and a Lifetime member of the Nature Printing Society DiCerbo has been able to meet a wide range of people with similar interests, including the master *gyotaku* artist Mineo Yamamoto also a lifetime member of the NPS and an avid fisherman. They met several years ago and have worked together on several occasions. Yamamoto invited DiCerbo to his studio in Japan to undergo intensive training in advanced *gyotaku* techniques, papermaking and *chine collé*. For many years DiCerbo had harboured the dream of visiting Japan and wanted to take up this opportunity to learn more about *gyotaku.* In order to realise this he launched 'The Fish Bridge to Japan Project' on the Kick starter website in 2011. Sixty two backers supported this project and DiCerbo was able to spend the summer of the same year in Japan as Yamamoto's student (Personal communication, April 14, 2012). During his stay he embraced the 'fish culture' of Japan and visited the infamous Tsukiji fish market in Tokyo, sampled a variety of Japanese seafood delicacies and unusual beverages containing real fish. Upon DiCerbo's return home to the USA he was instantly able to share his newly acquired skills and knowledge as he taught a number of *gyotaku* workshops, throughout the USA and was invited to write an article for the Symbiartic Scientific American blog

titled '*Kansetsu-ho* and the Ambassador of *Gyotaku*', thus enabling the dissemination and spread of *gyotaku* throughout the USA, and globally via the Internet.

Although Steve Thurston does not use *gyotaku* for his work as a science illustrator at the American Museum of Natural History, he does use the direct *gyotaku* technique combined with woodcut prints in his own art works. In a similar fashion to DiCerbo's illustration works, Thurston pushes the boundaries of *gyotaku* beyond the traditional and limitations of the unique print and uses *gyotaku* to create small editions of contemporary fine art prints. Thurston's addition of woodcut print images to his direct *gyotaku* are a visual expression of his observations and experiences of the location and conditions under which a particular fish was caught. The latter innovation imitates the *gyotaku* 'trophy print' or the record of a catch made by fishermen which includes such details as a written text rather than a pictoral one. Thurston highlights his philosophy:

> " I fish mostly from the shore. – Surf-casting. I catch the fish, respectfully kill it, print it (several prints can be made from one fish) wash off the ink then fillet, cook and gratefully eat it. – Usually just pan fried in butter and served with wasabi mayonnaise" (Thurston, 2010).

Thurston's *gyotaku*'s are printed first and left to dry, then at a later stage the wood cut prints are added, then the signature seal in red ink and finally the prints are numbered and signed in pencil (Figure 89). Thurston explains that as an avid fisherman he also comes from a fine art background:

> "having studied with Michi Itami[40] at the San Francisco Art Institute in the early 1980's. When I started making fish prints I didn't think of them as art, but as documentary, and therefore didn't make numbered editions. I've changed my opinion since then, and now make numbered editions, usually 5 to 10 images from each fish, with the same woodcut arrangement etc. Variations within a series I call A.P. 'artists proof'" (Personal communication April 12, 2012).

Although, Thurston has seen examples of indirect *gyotaku* he has never tried this technique as he prefers the boldness of the direct *gyotaku* technique, for which he uses mulberry papers and 'rice papers' purchased from the company (www.rice-paper.com) with oil based block printing inks.

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40 Michi Itami (b. 1938) is a well-known Japanese American artist with a career as a printmaking Professor at Universities including; the San Francisco Art Institute ,The City College of New York, City University of New York (CUNY)

Mary Jane Brush better known as M. J. Brush[41], the Science Illustrator taught Thurston *gyotaku* techniques when he was studying for his Bachelor of Science at the University of Connecticut in 1977.

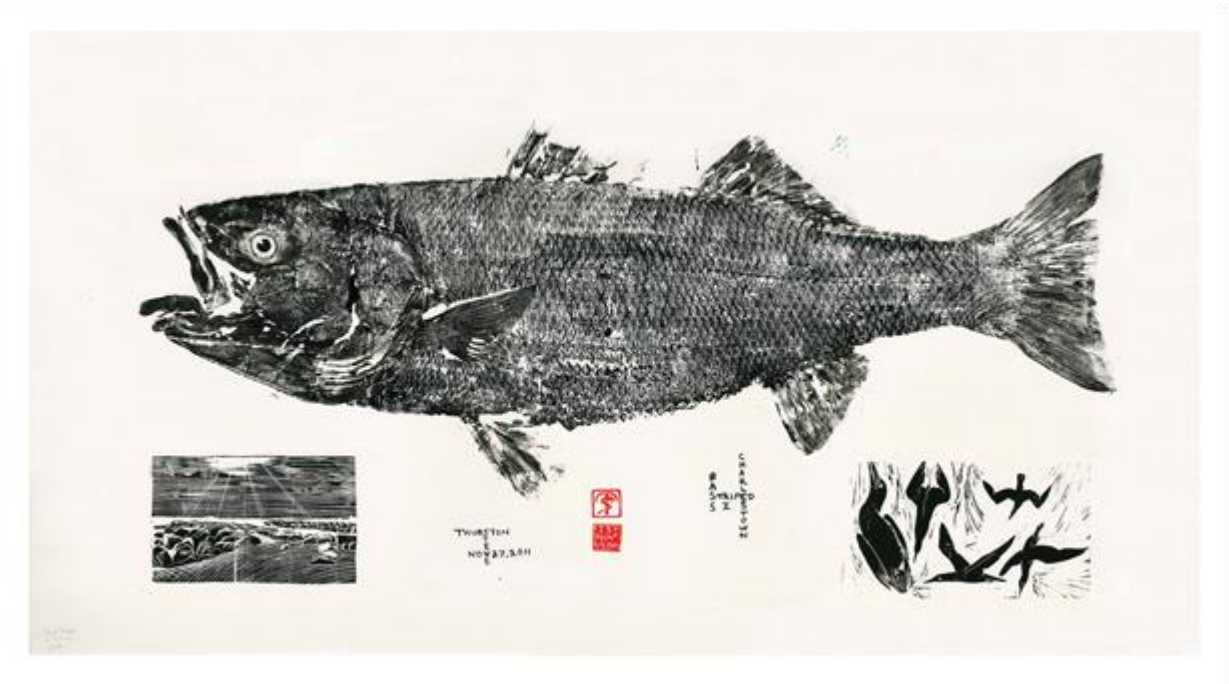

Figure 89 - 'Striper – Charlestown Series' direct *gyotaku* with woodcuts by Steve Thurston. The woodcut on the lower left is a visual image of the location where the fish was caught and the lower right woodcut is of northern gannets, which were diving close to shore and Thurston while he was fishing. Image courtesy of Steve Thurston.

Evidently, it is difficult to classify the people who created the *gyotaku* images as discussed in this section as many cross the borders of different fields such as illustration, graphic design, fishing, cooking, and art, all of which are creative practices in their own right. Those avid anglers who catch, print, cook, and eat the fish share a common practice of 'catch and release fishing', as they only cook a small proportion of what they catch and generally release ninety five percent of their catch. Furthermore, the artists and illustrators discussed in this section are united in a common concern for nature/marine conservation, and have a respect for nature. Even though the foundations

41 M.J. Brush retired in 2000 from Connecticut University after twenty five years of illustrating science and teaching.

of the images are based in *gyotaku* the practitioners visual output and methods for working with the technique, pushing its limits, and exploring new combinations of media, has led to diverse and highly original works which have been successfully applied to a wide range of illustration and graphic design projects.

5.5. Teachers

Gyotaku printing techniques provide an excellent interdisciplinary educational activity for people of all ages and levels of ability. The depth of content and the level of instruction, assistance, and supervision required varies depending on; the learners, the type of *gyotaku* class or workshop, and the time available. If a genuine fish, or a silicone life-form fish is used as the print matrix this gives the teacher an opportunity to introduce the topics of fish anatomy and habitat, conservation and environmental issues, Japanese culture and history, different types of printmaking techniques, and colour theory, to name only a few.

In the school science classroom, *gyotaku* provides an interactive hands on activity which can help children to equate science with fun and can accommodate a number of learning styles such as tactile, visual, and kinaesthetic. Investigating the anatomy of a fish under the guidance of a teacher also provides students with an opportunity to enhance their scientific process skills of; observing, comparing, contrasting, measuring, experimenting, and hypothesising. If students are provided with different types of substrates, inks or paints they can use scientific methods to experiment with the different materials in order to verify the combination which produces the best printed results:

> "The technique reinforces science as a human endeavour, illustrating that anyone can do science; *gyotaku* was developed by fishermen, not by stereotypic, white collared scientists in the laboratory. Students see that individuals from many different cultures can practice science as a means of finding solutions to their problems" (Stokes, 2001, p.22).

Various schemes exist which introduce educators to *gyotaku* and provide them with the necessary information and the practical skills to enable them to teach educational *gyotaku* classes.

In recognition of the necessity for future generations to undertake the task of managing the marine resources in the North American state of Virginia, various marine education projects are active in the coastal and inland school systems. Special teacher workshops began in the early 1980's called 'Seashops'. These were held by members of the Virginia Institute of Marine Science and supported by the Virginia Sea Grant Program[42] and included *gyotaku* workshops. "Until relatively recently, Virginia's school children had little opportunity to learn about marine resources, few textbooks contained information in this area of study; teacher training programs characteristically stressed other environments" (Lawrence, 1983, p.3).

Gyotaku has been recognised as an activity which helps students to develop both an interest in, and engage with science. "Combining the ancient Japanese art of fish printing with the study of fish anatomy through the elements and processes of art is an effective way to teach science to elementary students" (Bagget & Shaw, 2008, p.3). Sharron Huffman an experienced teacher and *gyotaku* artist asserts:

> "I taught school, mostly an elementary classroom teacher for many years. I guess it's in my blood, because nothing is more satisfying to me than helping someone learn the basics of traditional, professional level *gyotaku*." (Huffman, 2012)

Huffman provides classes at her studio in Portland, Oregon and is a visiting tutor for schools, she also teaches regularly at the annual Nature Printing Society workshops (Figure 90). Language presents no barriers when teaching *gyotaku* as Huffman proved recently when she was hired, even though she does not speak French, by two French speaking schools in Portland Oregon (L'Etoile French Immersion School and The French American International School) to provide *gyotaku* lessons.

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42 The National Oceanic and Atmospheric Administration (NOAA) of the United States Department of Commerce organises the Sea Grant College Program which is a network of 33 Sea Grant programs located in every coastal and Great Lakes state, Puerto Rico, Lake Champlain and Guam. Sea Grant serves as a core university-based network of over 300 institutions involving more than 3,000 scientists, engineers, educators, students and outreach experts.

Many schools, colleges, and universities in the USA include *gyotaku* projects as part of their curriculum. It is also taught in various marine educational schemes such as that found at the Los Angeles Cabrillo Marine Aquarium's 'Ocean Outreach' programme, in which instructors bring educational experiences, including *gyotaku* to classrooms across the region. These outreach schemes are approved by the L.A. City Board of Education and follow guidelines of the Science Framework and the California State Board of Education curriculum framework regarding science content standards for schools.

Figure 90 - Sharron Huffman teaching an octopus printing *gyotaku* class at the 2010 NPS annual workshop. Image courtesy of Bridget Benson.

Although *gyotaku* is not part of the curriculum for the majority of schools, colleges and universities in countries other than the USA, as the technique has spread across the world it has been used as a valuable educational tool at various events and in various locations. Vanessa Rouhani who works as the Water World co-ordinator for the South African Institute for Aquatic Biodiversity, (SAIAB) teaches *gyotaku* classes at the annual Grahamstown Foundation Science

Festival called SciFest Africa[43]. It was reported in the Aquazone International Newsletter of the South African Institute for Biodiversity that the popular *gyotaku* workshop enables learners to make their own fish print. In 2013 *haiku* was added to the classes for the first time, and learners were able to express their experiences of *gyotaku* in the form of a Japanese *haiku* poem. During the class Kathleen Anne Bethune wrote this *haiku*,

"Where do we find this

A fish covered in bright paint

Soon becoming art

Fish so small, naked waiting and vulnerable, for me to capture

Small fish waiting on absorbent paper

Paint brushing picture".

Mr. Khabayi a natural science teacher in South Africa explained: that the *gyotaku* with *haiku* classes held at SciFest Africa in March 2013 gave educators an opportunity to expose learners to new skills and careers he stated, "We do not have labs - there are no resources, therefore festivals like SciFest come in handy because learners do not only see these things but get a chance to take part in them" (SAIAB, 2013) (Figure 91).

43 SciFest Africa was launched in 1996 as a high profile, national event to promote the public awareness, understanding and appreciation of science and mathematics, to facilitate learning in these subjects in an informal way and to encourage the youth of South Africa to follow careers and become leaders in these fields. The festival was modelled on the well-known Edinburgh International Science Festival held in the UK.

Figure 91 - Children at the *gyotaku* and *haiku* workshop taught by Vanessa Rouhani at the 2013 SciFest Africa. Image courtesy of www.aquazone.sa

Kevin Redd is involved in another popular, annual, science festival which incorporates *gyotaku*; the National Science Week held in Australia. Redd decided to teach himself *gyotaku* when he was employed as a fisheries scientist, primarily at sea in the coastal waters of Alaska and Western Canada. With the enormous range of species caught by the research vessels Redd has an ample supply of specimens with which to practice. He now passes on his skills and knowledge by teaching and giving demonstrations of *gyotaku* as part of his work at the Marine Research Laboratories, of the Institute of Marine and Antarctic Studies at the University of Tasmania, and at other art and science related events held in Tasmania. Redd teaches *gyotaku* and nature printing techniques on a semi-regular basis providing at least five workshop per year. These are usually in conjunction with events such as the National Science Week, exhibitions at the University of Tasmania (UTAS) for example the exhibition 'Impressed by Nature' shown at the Morris Miller Library, UTAS, in 2011 which featured a number of *gyotaku* by the Japanese artist Boshu Nagase, and workshops held in the Tasmanian Museum and Art Gallery. The workshops cater for a diverse group of people from young children to adults. The *gyotaku* and nature printing workshops which Redd has taught at the annual Science Week in Tasmania have regularly seen over two hundred

people attend, creating *gyotaku* on paper, textiles and T-shirts (Figure 92). Redd also runs special workshops just for teachers so that they can introduce the techniques in their classroom activities.

Figure 92 - A T-Shirt featuring a direct *gyotaku* of a ray made during a Kevin Redd workshop for National Science Week in Tasmania. Image courtesy of www.scienceweek.net.au.

He explains:

> "I do teach a range of students. Quite often they are mixed groups (i.e. families with young children just out for some fun!) AND University students who really like the idea of printing from the animals they are studying. AND teachers wanting to take the concepts back to the classrooms. I'd say that most of the University age students were studying some form of biological science" (Personal communication August 14, 2012).

Learning is a lifelong activity and *gyotaku* teaching can be adapted for the elderly, physically and mentally challenged learners and can help to promote a sense of creative achievement and build self-confidence. Sally Nunnally, an Educational Coordinator at the Marine Resources Center at Fort Fisher, North Carolina, USA, who teaches *gyotaku* classes, commented:

> "she is especially happy watching others react to their work. Learning-disabled people have responded with proud grins at a print they've made" (Lawrence, 1983, p.22).

A hands-on approach is also encouraged at art festivals such as the 2013 Betty Foy Sanders Department of Art, Arts Fest which was held in April at the Georgia Southern University, College of Liberal Arts and Social Sciences, USA. *Gyotaku* workshops enabled the Arts Fest visitors to try the direct technique for themselves and take away their print. *Gyotaku* workshops are often held in museums and libraries to accompany particular exhibitions such as the *gyotaku* workshops held in December 2011 as part of the exhibition 'Grossology' at the National Geographic Museum in Washington, D.C. and the *gyotaku* workshop held May 2012 at the Juanita E. Thornton / Shepherd Park Public Library in Washington, D.C. in conjunction with the National Geographic Museum's exhibition 'Samurai: the Warrior Transformed'. The Smithsonian National Museum of Natural History held a *gyotaku* workshop in 2011 for children. Catherine Sutera the Assistant Ocean Science Educator explained some of the ways in which the children gained information about fishes as they made their prints:

> "My favorite was the flounder print. While talking to the museum visitor who was making the print, I explained how flounders swim with their bodies parallel to the bottom. I then explained that flounder, like all flatfish, have both eyes on one side of the body, while the opposite side is blind. Another great way to provide more information is to make a 'species identification card' that is attached to the print. On the cards, I include the common name the species name, and a few brief facts that include the fish's habitat and range" (Sutera, 2011).

Heather Fortner is an example of an artist who teaches *gyotaku* techniques and similar to Redd, has a background in science. Her book concerning edible seaweeds *The Limu Eater*, was published by the Sea Grant Program in 1978 when she was an undergraduate student of natural sciences at the University of Hawaii. In 1976 Fortner's first encounter with *gyotaku* took place when she saw an impression of fish hanging on the wall of a friend's house in Hawaii. Fortner remarks:

> "I was at a friend's house in Hawaii and on his wall he had a big, long print of many red fish and it was the most beautiful thing I'd ever seen. I asked him who made this beautiful thing and he replied well I did and then I asked him well how long have you been practising this art form to make something so beautiful and he replied that was the first thing I ever did. At that point I had to fish print" (Cain, 2001).

She has been studying and practising *gyotaku* ever since. Similar to Hochberg, Fortner is skilled in printing both aquatic and botanical specimens. Her interest in seaweeds is evident in many of her *gyotaku* fish compositions which contain impressions of seaweed which are collected from the same habitat as that of the particular fishes or other specimens (Figure 93). Fortner has also produced a field guide to the common seaweeds of the central Gulf coast of Florida as she was unable to find one when she lived there.

Figure 93 - Heather Fortner *gyotaku* featuring seaweed and Atlantic spade-fish, titled 'Spade-fish Samba'. Image courtesy of www.heatherfortner.com

Since 1986 Fortner has taught *gyotaku* direct and indirect *gyotaku* techniques in beginners and advanced workshops. She perfected her skills and aesthetic sensibilities when working at sea, often printing for eight hours and then working for eight hours. When other merchant seamen would go ashore to relax Fortner was to be found at the local fish markets, purchasing specimens for her future prints. She describes aspects of *gyotaku* work:

> "For 30 years her life involved working on and around the ocean; first as a commercial fisherman in Hawaii, then as a deckhand on research vessels in Hawaii and Alaska, and finally as a ship's officer and Master in the US merchant marine. She would often set up a studio on board the large merchant vessels and print fishes caught from the vessel or found in fish markets in foreign ports. This travel gave her access to unusual fish as well as the opportunity to study with some of the Japanese master *Gyotaku* artists in their studios in Japan" (Fortner, n.d.).

In 2002 she established 'Orchid Street Studio' in Sarasota, Florida, USA where she taught classes and workshops in *gyotaku* for over ten years. Moreover, her recent move to Toledo in Oregon did not hinder her teaching schedule. Fortner moved her studio and set up the 'Sea Fern Nature Printing Studio' in which she teaches; various nature printing processes, *gyotaku* techniques including the Hawaiian technique, direct and indirect *gyotaku* for beginners to advanced, paper making, and mono printing techniques for which she uses a 76 x 152 cm Takach etching press. Furthermore, Fortner has provided *gyotaku*, nature printing, and seaweed appreciation workshops and classes in a number of venues across the USA including, the Sitka Center for Art and Ecology, the Marie Selby Botanical Gardens, and the Mote Marine Laboratory.

Fortner provides a free PDF file on her website at (http.//www.heatherfortner.com) titled '*Gyotaku* the Art of Fish Print', a comprehensive, step by step guide of how to make a colour direct *gyotaku* of a fish. Fortner also made an informative step by step DVD in 2008, titled *Heather Fortner Presents Gyotaku the Art of the Fish Print* (Fortner, 2008). The DVD introduces the viewer to *gyotaku* and the tools used to take an impression, how and why it is necessary to clean and prepare a fish ready for printing, how to make a direct *gyotaku* multi coloured print with oil based ink, and the same with water based ink, how to print the same fish to form a composition, how to paint in the fish eye, how to sign and finish the print, accompanied by a list of suppliers and further sources of information regarding *gyotaku*. Carolyn A. Dahl featured several of Fortner's aquatic and botanical *gyotaku* works in her book *Natural Impressions: Taking an Artistic Path Through Nature* (2002). The front cover of the book the *Art of Printing from Nature. A Guidebook from the Nature Printing Society* (Larsen, 2011) has a Red Grouper *gyotaku* made by Fortner and the inside pages feature her step by step instructions for '*Gyotaku* - the art of fish print' and 'The eye of the fish'. Her *gyotaku* works have been exhibited widely in the USA, Canada, Europe and Japan. As a teacher she

has introduced numerous individuals and groups to *gyotaku* and has mentored several successful wildlife artists. Fortner, states that:

> *"gyotaku* has opened up a door for me, as I didn't feel at all artistic or creative. But once I started doing this I realised I was" (Cain, 2001).

Fortner's comment is often shared by adult learners who can be pleasantly surprised by the results of their *gyotaku* efforts and their own creative abilities.

5.6. Scientists and Naturalists

James Prosek is an artist, writer, fisherman, conservationist, and naturalist who has been called "a kind of underwater Audubon" (Greenberg, 2010, p. 20). During his childhood Prosek developed a passion for fishing, and drawing fish and other animals, particularly birds. His father grew up in Brazil with an interest in birds and was responsible for introducing the young Prosek to the works of Audubon. He spent hours drawing copies of Audubon's works and accompanied his father on walks to watch birds in Connecticut where he grew up. Natural history, a fascination with water, birds and fish, and the 'spaces between things' have proved to be the major influences on Prosek's paintings and illustrations which span both the realms of abstraction and realism.

Trout an Illustrated History, Prosek's first book was published in 1996 when he was only nineteen years of age. In 1999 he met Yvon Chouinard the founder of the Patagonia outdoor clothing company and together they formed the World Trout project, an on-going conservation programme to preserve native trout species across the world. The aim of the World Trout project is to "identify the individuals and groups that protect native fish habitat, to tell their story and support their conservation efforts by placing money into the hands of the actual groups protecting the fish." (Klyn, n. d.). Since its inception in 2005, the World Trout project has sold more than one hundred thousand T-shirts featuring the art work of Prosek and other artists. For every T-shirt sold five American dollars goes towards the groups and individuals who protect trout.

Following on from the initial success of his first book, *Joe and Me: An Education in Fishing and Friendship* was published in 1997. Since then a further nine books of Prosek's have been published, his latest is *Ocean Fishes* (Prosek, 2012) which features reproductions of thirty five of his life-size watercolour paintings of fishes from the North Atlantic. Concerned with capturing the realistic colours and markings of the fishes when first caught, Prosek travelled to record his subject matter, taking photos, and video footage, and filling notebooks with his observations. This myriad of observations were transformed into thirty five life-size paintings at his studio. In the mirror like quality of the fishes' bodies there is evidence of the artist's presence, colours from Prosek's rain jacket can sometimes be seen, or even a faint image of the artist captured in a fishes eye. Instead of eliminating these visible traces of himself, Prosek claims that they add to the authenticity of the fishes as this is how they appeared at the time they were caught. His art works can be found in prestigious collections in the USA such as the Whitney Museum of American Art in New York, the National Academy of Sciences in Washington D.C. and the Smithsonian National Postal Museum.

Although Prosek is perhaps know best for his watercolour paintings and illustrations he also practices *gyotaku.* He states: "I started inking fish and making impressions of them after my first trip to Japan which was in 1998" (Mitchell & Fulton, 2010). Prosek visited Hokkaido and recalls that he saw *gyotaku* on the walls of a fishing tackle shop. The primary purpose of his trip to Japan was to look for native species of trout and char to paint for a book which he was working on at the time. Atlantic salmon, trout, striped bass, lily pads and sunfish have all been used as subject matter for Prosek's *gyotaku* which he first started to make in 1999. His first experiments with *gyotaku* were with 'rice paper' and *sumi* ink, which he painted onto a clean fish and then pressed the paper on top. This method was adapted to make abstract images using eels. These works represent what Prosek has describes as:

> "the spaces in between things", which mean many things to him but "mostly it's the attempt to document something intangible like personal experience. I also feel eels are as close to a manifestation

of water that exists in the world" (Personal communication, March 3, 2013).

In fact many of his eel *gyotaku*'s resemble reflections or currents in water itself.

Prosek has produced numerous direct *gyotaku* works from inking eels and applying them to paper in the same manner as the artist Julian Meredith. Rather than placing the paper on top of the inked specimen both artists place the inked specimen on top of the paper. The larger eel works consist of several sheets or rolls of white paper with the eels printed in different intensities of black *sumi* ink or black Indian ink which is often slightly diluted. White Saunders watercolour paper is frequently used for the eel prints and is sometimes stained a brownish colour with tea and various coloured inks. Prosek has been creating his 'Eel' *gyotaku* art works since at least 2001 and intends to continue. Many of the Eel works have been on public display in exhibitions such as 'James Prosek: Abstract Nature' 2013, held at the Mark W. Potter Gallery, Watertown, Connecticut and 'James Prosek: Ocean Fishes, Birds and Curiosities' at the National Arts Club, New York, and 'Symmetry and Myth' held in 2005 at the Fleischer-Ollman Gallery in Philadelphia. His largest eel *gyotaku* measures 2.44 m x 3.05 m and is in the collection of the Addison Gallery of American Art in Andover, Massachusetts, USA.

Some of Prosek's 'Eel' *gyotaku* are included in the Public Broadcasting Service (PBS) television film 'The Mystery of Eels' which recounts Prosek's journey researching eels and was primarily filmed in Japan and New Zealand in 2010. Prosek elaborates about his eel works stating:

> "Normally when people make *gyotaku,* these fish ink paintings, they use fish that have big scales like carp because they show up really well. But because I was interested in eels I thought I would try doing it with eels and so I started inking eels and stamping them on paper. I just loved the beautiful kind of abstractions I could make them and the sort of flow I could suggest by using the actual fish to create the picture. So they're really this hybrid between realism painting because I'm using a fish and abstraction. In my process if I impose limits on the sort of materials that I'm using you find or are forced to find new possibilities. So if I have three simple pieces of equipment a piece of paper, ink and an eel and I have to work in those parameters I find that I can explore endlessly. I can take the fish and ink it and make one impression and another impression and the third impression and each impression is totally different. The first impression is dark, the second shows more texture of the fish and the third impression is just this ghostly image. If I pile those three types of image over and over and over I can create this weird type of image almost like an x-ray. The eels to me are really more than any other fish the manifestation of the spaces between things. We really only care about what we can see, and study,

> and quantify, and solve, but there's a space between everything but because we can't explain it we don't give that much import to. But I feel that space in between things is very important. In a lot of my work I'm trying to make visible manifestations of what I imagine that space to be and a lot of these Eel pictures are that kind of flow between things" (Mitchell & Fulton, 2010).

Prosek's research for his book *Eels: An Exploration from New Zealand to the Sargasso of the World's Most Mysterious Fish,* (2010) the time which he has spent creating *gyotaku* art works with the fish, (Figure 94 and Figure 95) and his growing collection of eel art and eel fishing spears at his home, have led to a great affinity with the eel. In many ways Prosek identifies with the eel as he feels that like himself, the fish does not easily fit into any particular category.

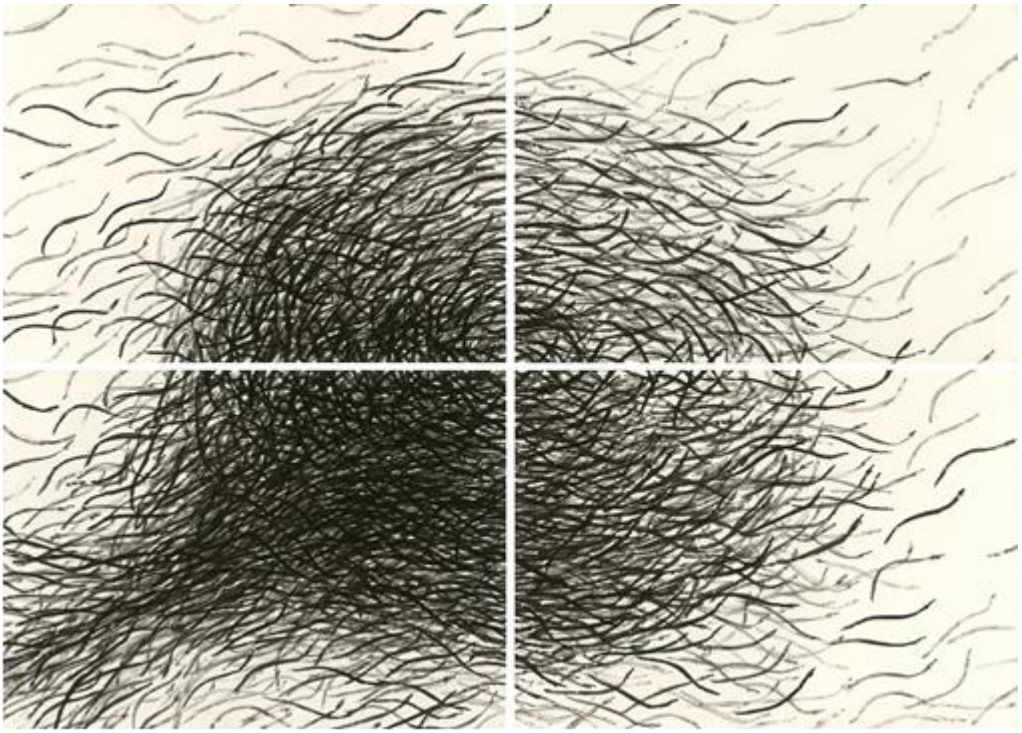

Figure 94 - James Prosek, direct *gyotaku* 'Eels', 2.44 m X 3.05 m. Image courtesy of James Prosek.

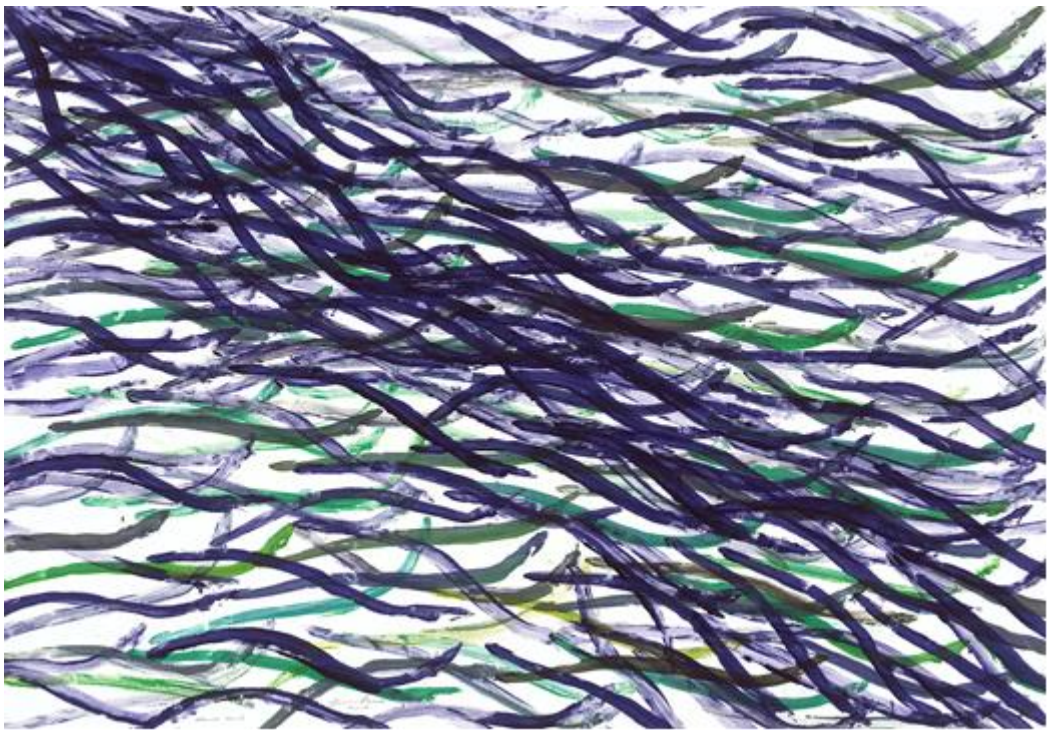

Figure 95 - James Prosek, direct *gyotaku*, 'Eels', 61 cm X 91.5 cm. Image courtesy of James Prosek.

Genevieve (Genny) and Shane Anderson are a couple that are also difficult to fit into a category. Their work and interests are far ranging from marine biology, natural history, and natural history illustrations, to *gyotaku* art, fishing, and SCUBA diving. In 2007 the Anderson's were the first joint recipients of the Naturalist of the Year from the Western Society of Naturalists (WSN). The WSN was founded in 1916 and its main objective is to stimulate a general interest in biology, which it does effectively by bringing together students, faculty, researchers, and enthusiasts of natural history to share their research and philosophies at its annual meetings. The award honours those individuals whose research, mentorship, and service help to define our future by inspiring young people with the wonders and sheer joy of natural history.

Since 1982 Genny Anderson has taught biological oceanography, marine biology, and natural history at the Santa Barbara City College, California, USA. Shane Anderson has been the Marine Collector/ Naturalist at the University of California at Santa Barbara (UCSB) since 1975.

Together they took their first class in *gyotaku* (as discussed in chapter two), and their first tutor was their friend Eric Hochberg. They explain their involvement with *gyotaku*:

> "We learned 'direct' *gyotaku* where we put ink on our fish and then pressed paper on top to get a mirror image. Since about the year 2000 we have been taking classes from a Japanese master *gyotaku* printer, Mineo Yamamoto, who comes to the US about once a year to teach his techniques. Mineo teaches the indirect method which is more time consuming and produces an image that has much greater detail" (Anderson, n.d.).

In conversations with the Anderson's in 2010 it was revealed that their *gyotaku's* are influenced by natural history illustrations of marine life particularly early copperplate engravings. In a similar fashion to those illustrations the backgrounds of the Anderson's prints are often left unadorned, revealing the white or navy blue fabric, which is the couple's preferred substrate for printing indirect *gyotaku*. Reflecting their scientific training and the 'trophy prints' made by fishermen the couple accurately record the information about each specimen printed including; when and where it was caught or found, or who donated it, the common and scientific name, any outstanding features, notes about the condition of the specimens, and various measurements which are all accompanied by numerable photographs which will be referred to during and after printing.

Once a specimen has been printed the *gyotaku* is left to dry, then it is ironed to set the ink and washed to remove any traces of glue and once dry ironed again and the eye painted in by hand. Perfecting the eye may take a considerable amount of time, and they refer to their collection of photographs and scientific guide books and also experiment with different versions of eyes painted in the correct size on paper, and then cut them out and place them on top of the *gyotaku*. It is only when they have perfected the eye that it will be painted on to the fabric. When viewing such detailed and life-like *gyotaku* images such as those produced by the Anderson's the head of the fishes tends to draw the viewers' attention and is part of the justification for accurately painting the eye using the correct colours to produce a successful and believable image. The navy blue fabric is generally printed with silver or white ink and in keeping with the monotone appearance the eye is painted in various intensities of silver or white. Although the Anderson's do produce their own

individual works their larger specimens are a collaboration (Figure 96) and they work together at all stages of the process they explained:

> "These generally take us three to four days each, with both of us printing at the same time about 10 hours a day. Most marine specimens get quite smelly after a short period of time so we can't spread our work out over more than a few days" (Anderson & Anderson, 2008, p.1).

Figure 96 - Genny & Shane Anderson with an indirect *gyotaku* in silver ink on navy fabric of a juvenile great white shark, *Carcharodon carcharias* (work in progress, December 2005). Image Courtesy of Genny & Shane Anderson.

Once they are satisfied with a print and the eye has been painted in they sign it with two red signature seals, one belongs to Genny, and the other to Shane. Then they spend at least another day preparing the print for display as a wall hanging. This involves sewing the edges of the fabric in order that either bamboo poles, wooden poles or some other form of device can be inserted into the fabric so that the print can be displayed as a wall hanging (Figure 97):

> "Many times our specimen is a unique find and we may never be able to get it again. The resulting print usually becomes something that we cannot bear to give up, however some of our family and friends have really wanted copies of our *gyotaku* work" (Anderson & Anderson, 2008, P.1).

With this in mind they began investigating a suitable method of reproducing their original *gyotaku* and produced their first digital print on canvas in 2006:

> "We used the highest quality settings on our camera producing images that were about 10 MB and 9,000 by 6,00 pixels (at 300 dpi) which prints very nicely at sizes up to 20 X 30 inches. Once we have a digital image we can keep it exactly the same as the original *gyotaku* or manipulate it, in Photoshop to change the orientation of the image or the colour of the background." (Anderson & Anderson, 2008, p.1).

The digital prints are made with archival quality inks at a local camera shop/lab and can be printed onto a range of substrates with a final coating to protect the image from environmental pollutants and to filter Ultra Violet light. Each digital print is issued with a certificate of authenticity by the Anderson's who keep a record of who receives each print. Digital prints have enabled the couple to not only reproduce their *gyotaku* originals for family and friends but also to donate digital reproductions on canvas to various organisations for fund raising auctions and events. The Anderson's have exhibited their original *gyotaku* in the USA at NPS Annual Workshops, at an exhibition in the Forest Lawn Museum in Glendale, California entitled 'Artistic Nature: Plant Animal and Stone Printing' October 2005 until January 2006 and in Japan at the annual exhibition organised by the International Fish Print Studio, in Higashimatsuyama, Saitama Prefecture (Figure 97).

A range of visual imaging techniques and technologies now exist that assist the study of science and the natural world, some of which are also used to create art. Perhaps if the scientist Dr. Marjorie Cortenay- Latimer, the discoverer of the first coelacanth (discussed in chapter three), had known the simple direct *gyotaku* technique used by fisherman to record their catch, she could have made a direct *gyotaku* in black ink to accurately record the external morphology of the coelacanth specimen discovered in 1938. This image might have led to a more positive response from the wider scientific community at the time, and would provide today's scientists with a valued image to study.

Figure 97 - Genny & Shane Anderson's indirect *gyotaku* of a Northern fur seal, *Callorhinus ursinus*, printed August 2005 exhibited at the 12th International Fish print Show, Tokyo, Japan, November 2005. Image courtesy of www.marinebio.net

However, the *gyotaku* art work of Prosek and the Anderson's are not merely a by-product of scientific discovery and/or investigations although their artwork has undoubtedly been enriched by their research activities. The skill of observation plays a major role in all of their *gyotaku* works, either from observing the specimens alive in their natural habitat when SCUBA diving, or by being present when fishes are caught by a fisherman and exit their own environment, or from the hands on experience and observations made when handling and printing dead and preserved specimens. The Anderson's and Prosek have a keen appreciation of colour and form in their work although this has been put to different uses. The Anderson's create highly detailed and accurate life-like colours and forms within the print of each specimen and Prosek uses the Eel to generate an abstract image and a feeling of otherness. Furthermore, the Anderson's and Prosek possess a great understanding and knowledge of their subject matter, and an affinity with nature which has lead them to the use of two

different *gyotaku* techniques; the direct and indirect, to create their own unique visual expressions and celebrations of nature which are stylistically and contextually very different from each other.

5.7. Fishermen

The term 'fisherman', or 'angler' is used in this thesis to describe people of either gender who go fishing for pleasure rather than for financial gain or culinary value. The term 'commercial fisherman' and the term 'Lobsterman' as discussed in this section is used to describe people who go fishing in order to sell their catch, be it fishes or lobsters.

Fisherman, *gyotaku* artist, marine scientist, writer/author, and editor in chief of the *Sport Fishing Magazine*, in the USA, Doug Olander has created *gyotaku* from fishes that he has caught from Alaska to the Amazon. His fascination with fish stems from his studies in fisheries science, fishing, and capturing their form on paper using the direct *gyotaku* technique. Olander uses a range of white and coloured Japanese papers with water based paints or inks. When preparing the fish he cleans off any mucous using salt as the majority of his *gyotaku* are created from fish that he has caught, printed and then cooked and eaten. Olander (1994, p.7) claims "Getting really fresh fish is, for me, one of the most important, enjoyable - and sometimes challenging---parts of the *gyotaku* process." He keeps records of the fishes that he catches and these become part of the storyline for each *gyotaku*. The mahi-mahi sometimes called a dolphin fish or dorado, *Coryphaena hippurus* is Olander's favourite game fish and two direct *gyotaku* compositions of these fish, one on a white background, and the other on a dark blue background can be found in his book *Gyotaku Fish Impressions: the Art of Japanese Fish Printing by Doug Olander (*Olander, 1994). It is interesting to note that both the story lines behind these two *gyotaku* refer to the need for conservation of the marine environment. The mahi-mahi *gyotaku* on the white background (plate 4) was made from

only one fish the others caught that day were 'catch and release'. Olander is an advocate of 'catch and release' fishing both as a recreational fisherman and fisheries scientist. As a long-time member of the International Game Fishing Association (IGFA) and an IGFA Representative of the International Committee, Olander supports the numerous goals and programs of the IGFA with an emphasis on promoting the conservation objectives of the IGFA. The mahi-mahi *gyotaku* on the dark blue background (plate 28) was caught by Olander during a fishing trip with his daughter outside the northern Florida Keys in the early 1990's. She spotted an old refrigerator floating in the water, knowing that fish would gather around anything afloat in ocean Olander caught a small mahi-mahi which later became the *gyotaku* impression. The old refrigerator is just one example which demonstrates the amount of rubbish that was already present in the oceans in the early 1990's (Burns, 2007). Olander has not only campaigned for cleaner oceans and the creation of maritime conservation areas to protect critical habitat, he has also encouraged support for the Gulf of Mexico Fishery Management Council campaign for 'Rigs-to Reefs' (RTR) (Olander, 2012). Approximately four hundred and twenty decommissioned offshore oil and petroleum platforms have been decommissioned and turned into artificial reefs as of September 2012. The USA Department of Interior ordered that these sites are given the federal designation of 'Essential Fish Habitat' and 'Habitat Area of Particular Concern'.

Olander described his first encounter with *gyotaku:*

> "The first time I watched a fish become a painting, I was a graduate student at the University of Washington's College of Fisheries. The year was 1973.
>
> I'd never heard of *gyotaku*. But neither had almost anyone among the visitors who flocked to the annual open house at the national Marine Fisheries Service research center in Seattle. Curious about what drew a crowd around one of the tables, I squeezed in to see one of the biologists sharing a hobby as he carefully lifted a sheet of rice paper from a rockfish. The result, an inky black impression that resembled a cave painting or perhaps a fossil piqued my interest in both fish and art. As I watched him go through the process several times more, I decided I'd have to try it at home. I did, many times, over and over. Some *gyotaku* artists have had formal training but my circumstances and budget made me learn techniques through persistent trial-and-error----perhaps in part the origins of a unique style.
>
> Little did I know that two decades later I'd still be making *gyotaku* impressions; that my art would win

awards and sell in galleries; that it would be the subject of feature articles in major newspapers including the *Miami Herald* and appear on t-shirts. Least of all did I suspect to be writing the introduction to a table top book of my *gyotaku* art" (Olander, 1994, p.6).

The late Robert Allan Cale, (1940-1990) was an artist, teacher, and master printer who also earned a living as a lobster fisherman in Stonington, Connecticut. Cale graduated from the Rhode Island School of Design in 1964 and studied printmaking at Stanley William Hayter's[44] Atelier 17 in Paris for a year from 1969 until 1970 where he became an assistant to Hayter and worked closely with the artist and associate director Krishna Reddy:

"At the Atelier Cale learned and discovered many techniques including the viscosity printing method developed by Hayter and his associate Krishna Reddy. This technique is a means of using several colours in a print without having to prepare several plates, all colors are applied to a single plate. In order to make this possible, the printmaker must make two adjustments with each color: the viscosity of the ink must be different for each colour and the roller used to apply each colour must vary in the degree of softness or hardness. For example, if the first color to be applied is red, the ink must be oily and applied with a hard roller. This roller will brush against the highest surfaces of the plate, without squeezing into the recesses. Then blue is applied, now with an ink that is less oily. The oil in the red ink will repel the blue ink. Moreover, the blue ink is applied with a softer roller which will press into the lower recesses of the plate. The third ink, yellow perhaps, will contain even less oil and is applied with an even softer roller. In applying the inks this way, the colors will be separated, yet only one plate is used" (Zeifer, 1972, p.57).

Despite the fact that this description of the viscosity printing technique refers to a plate, Cale adapted the technique and his 'plates' were fishes and other marine specimens. His early *gyotaku* prints such as 'Medium Tuna Head' printed in Paris in 1969 were produced in only one colour, black and the eye was painted in by hand.

On his return to the USA in the summer of 1970 Cale began experimenting with the viscosity technique in Stonington Connecticut, producing multi-coloured prints on heavy weight papers. 'Skate Race' is an early example of a *gyotaku* viscosity print created by Cale on a heavy weight printing paper measuring 19 x 27 inches rather than a lightweight Japanese paper. Three different size skates are arranged in a circular formation which gives the appearance of movement.

44 Stanley William Hayter (1901-1988) was a British printmaker and painter noted for his development of viscosity printing and as the founder of Atelier 17 printmaking studio in Paris and later in New York City. Hayter encouraged contemporary artists to use printmaking as a medium and collaborated on print editions with artists including; Miró, Picasso, Kandinsky, Pollock and Rothko.

These were inked with oil based litho inks, first a reasonably dry blue ink was applied with a small rubber roller, then a medium oily red ink was applied and lastly a very oily yellow ink. A sheet of pre-dampened paper was laid on top and Cale pressed the paper with his fingers to gain an impression and then gently removed the paper. In areas such as the fins and tail where the skates were drier the blue ink stuck to these parts and when the paper was removed it produced a slight 'pick' effect which rather than being a technical fault added to the texture of the print and enhanced its appearance. During the same year Cale's work was exhibited widely in the USA and in shows in France, Israel, Japan and Morocco.

In 1971 Cale became a printmaking instructor and master printer at Robert Blackburn's Printmaking Workshop in New York[45]. However, Cale continued to go fishing and used his catch to further develop his *gyotaku* impressions. He began to experiment with the backgrounds of the papers creating marbled papers and he used powdered dyes to simulate water. As larger specimens were used such as a 150 cm sandbar shark, Cale experimented with different types of fabrics as the printing substrate (Cruickshank, 1975). He also produced editions of prints from fishes which he inked and applied directly onto a litho plate such as 'Porgy' created in 1972 measuring 22 x 29 inches. As a master printmaker Cale began to take commissions to print the works of other artists including Will Barnet (1911-2012), Thom de Jong (1940-1988), Karl Schrag (1912-1994) and Linda Plotkin (b.1938). In 1972 Cale became an instructor at the Pratt Graphics Center in New York City and the artist-in- residence and visiting artist at Trinity College, Connecticut where he worked until 1978. From 1974 to 1976 he was awarded a grant from the Connecticut Commission

45 The Robert Blackburn Printmaking Workshop started in 1948 with the help of Blackburn's teacher and mentor the artist Will Barnett. During the 1950's Blackburn shared his workshop with artist-printmakers pioneering new techniques such as Will Barnett, Jacob Lawrence and Romare Bearden. In 1971 the workshop was incorporated as the not-for-profit Printmaking Workshop (PMW) and has served as the model for community based cooperative print workshops in the USA and abroad.

on the Arts to set up a printmaking workshop in Stonington, Connecticut, the seaport town where he was born and living at that time:

> "The Stonington Workshop is Cale's way of rectifying what he feels is lacking in Stonington. The workshop offers instruction, equipment and an environment for printmaking, photography and courses in art for children. Cale is working to get the workshop designated as a non-profit organization so individuals can make financial contributions to it. So far it has been funded by grants and money from Cale's pocket." (Brown, 1978, p.4).

Robert W. Starkey a former printmaking student of Cale's at Trinity College became the assistant director at the Stonington Workshop from 1974 to 1975. When Starkey graduated from college he went to work twelve hours a day in a plastics factory and in the spring of 1974 he helped Cale open the printmaking studio at Stonington. Starkey recalls that:

> "We went lobstering in the wee hours of the morning. Then on Fridays I sold lobsters out of the trunk of my car back at the factory" (Davidson, 1990, p.5).

Although, Cale was having some success as an artist, running the studio proved to be a costly venture and to support this Cale made extra money through teaching and fishing for lobsters.

As a commercial fisherman Cale was able to catch and use the fishes and other specimens for his art as he required very fresh fish. Instead of thoroughly cleaning the bodies of the fishes Cale liked to keep a layer of oil or oily mucous on the fish which would regulate the rejection or acceptance of the oil based lithography inks he used on the fishes and other specimens. Therefore, each specimen reacts differently depending upon the amount of time that it has been out of the water, its freshness and condition, and how many times it has been printed. Once Cale had perfected his viscosity *gyotaku* technique with single fishes on single sheets of paper he experimented with compositions and colours (Simons, 1981). The work titled 'Orange and Blue Group' is of a shoal of forty or more flat fish that Cale printed with oil based ink and later dyed the entire sheet of paper (Figure 98). This work was exhibited at the touring show 'Pressed on Paper: Fish Rubbings and Nature Prints' organised by the Santa Barbara Museum of Natural History and the Nature Printing

Society which toured with the Smithsonian Institution Travelling Exhibition Service (SITES) from 1981 to 1987.

However, it was not only salt water fishes that Cale printed. From 1977 to 1978 the touring exhibition 'Atelier 17, a 50 Year Retrospective' of one hundred and fifty four prints from artist who have collaborated and experimented with printmaking techniques at Atelier 17, featured Cale's *gyotaku* print 'Brochet' the French name for the freshwater pike. The pike image was also reproduced in the catalogue for the show. In 1976 Cale printed 'Sunflower', (Figure 99) published by Lakeside Studios in Michigan[46].

Figure 98 - Fish print by Robert Cale, displayed in the touring exhibition 'Pressed on Paper: Fish Rubbings and Nature Prints'. Photograph by Hara Humbered courtesy of Eric Hochberg.

46 Lakeside Studios in Lakeside, Michigan, USA, opened in 1968 as a publisher of limited edition fine art prints.

Figure 99 - Figure – 99 'Sunflower' printed by Robert Cale in 1976 and published by the Lakeside Studio, Michigan, USA. Image courtesy of the University of Iowa Museum of Digital Art Collection ©.

From 1981 to 1982 Cale was the printmaking instructor and master printer at the Lyme Academy of Fine Arts, Connecticut. Cale's work can be found in public collection such as the Bibliotheque Nationale in Paris, France, the Library of Congress Washington, D.C., the Yale University Art Collection, New Haven, Connecticut, and the Santa Barbara Museum of Art in California and corporate collections in New York City, USA, such as J. Walter Thompson Inc., Chase Manhattan Bank, Citibank and Marine Midland Bank (Siegesmund, 1973). At the time of Cale's death in1990 he had closed the Stonington Workshop and was making a living as a commercial fisherman although his prints were on display at the Anguilla Art Gallery, in Stonington Connecticut. Cale died in an accident at sea and it is thought that his lobster boat capsized off Fishers Island off the south eastern coast of Connecticut. "Tod Johnstone, owner of the

Anguilla Gallery on Water Street, described Cale as a man who was on the water all of his life and combined his love of fishing with his skill as an artist" (Fitts, 1990, p.10).

It is not only individual fishermen who practise and promote the art of *gyotaku* but also organisations which support tourism, fishing exhibitions and trade show events. Recognising the potential that *gyotaku* has to encourage the cultural communication in East Asia and to attract more visitors and foreign interest in the fishing culture and industry of the Thousand Island Lake area of Zhejiang Province in China the local authorities organised the first ever fish printing competition in China. The event was held over three days in June 2011 and attracted over sixty artists and *gyotaku* aficionados and experts from China, Japan and South Korea:

> "The youngest contestant, Yang Tianzhou, is only 11 years old. He learned the skills from his father, an experienced fish print artist and author of the famous 'Painting the Fish in Thousand-Island-Lake'. Yang Tianzhou said, 'I think it's very challenging to match the right color with the fish body. My dad made me this cap with fishtail, he told me that if I want to capture the vivid look of the fish, I should imagine myself as the fish'" (Fang, 2011, n. p.).

One of the highlights of the 2012 China Fish CGC Expo, held in the Weihai International Exhibition Center in Weihai, China was an exhibition of *gyotaku*. Visitors were able to watch artists at work printing fish and were able to try the technique themselves. Due to the success of the *gyotaku* displays, in 2012 plans were made to include a similar display and demonstration at the 2013 China Fish Expo to be held in the New China International Exhibition Center in Beijing. However, *gyotaku* demonstrations, exhibitions and workshops are common features of trade fairs and conferences concerned with fishing in Japan. The 2012 trade fair event organised by the Osaka Fishing Tackle Association attracted over fifty thousand visitors to the three day event including; commercial and sports fishermen, dealers, suppliers, retailers and manufacturers of various kinds of fishing equipment and materials, family members, representatives of fishermen's organisations, environmentalists, media persons, conservationists and government officials. One of the shows chief highlights was advertised as 'Fish Printing Classes'.

Gyotaku printing is a popular art form in Hawaii where there are a number of professional *gyotaku* artists creating unique art works. Some of the artists provide a 'trophy print' service for sports fishermen as a means of recording their catch. Dane Kai Kondo based in O'ahu, Hawaii believes that each *gyotaku* impression also carries a story with it. He states:

> "That's what makes each fish unique and special. You can remember how it was caught, who you were with and, for me, the exact scene. You can share the fish with a few people when you eat it, but a *gyotaku* will allow you to share the story with everyone who sees it" (Lo, 2004, p.4).

Evidently, many of the *gyotaku* practitioners discussed in this chapter are involved with fishing either as; sports fishing or recreational fishing, commercial fishing or field work fishing to obtain specimens for scientific study. Some *gyotaku* practitioners such as Mineo Yamamoto, began creating *gyotaku* as an extension of their interest in fishing. All of the practitioners discussed are concerned with the conservation of aquatic life forms and environments and many of them are actively involved in enterprises such as James Prosek and the World Trout project. Many of the fishermen practice and promote 'catch and release' and when they do catch and kill a fish as many *gyotaku* prints as possible are taken from the specimen and then it is cleaned cooked and eaten. Acquiring fishes or other specimens for the purpose of *gyotaku*, can be done by purchasing them from a reputable supplier for consumption, via scientific donations or collections, or found already dead when beach combing. However, it is essential that fishing laws and regulations are followed to ensure the future of biodiversity. In many countries a fishing license is required and restrictions may exist regarding the method and equipment used for fishing, the location which can be fished, the type of species which can be caught, the size, and the fishing season. Many *gyotaku* practitioners share the same thoughts about fishing as Naoki Hayashi, the professional *gyotaku* artist and spear fisherman when he states:

"I always go back to why do we kill fish? Consumption. I truly believe in selective fishing" (Lo, 2004, p.4).

6. Paper and Papermaking

6.1. Introduction

Today a variety of handmade and mass produced materials and tools are employed in *gyotaku* techniques. Although the origin of the direct and indirect *gyotaku* techniques remains uncertain it is apparent that they could not have come into existence without specific materials such as strong yet lightweight, flexible papers and black *sumi* ink. Japanese papers that are composed of long fibres with a random grain direction have an exceptional wet strength and flexibility which facilitates the moulding and gentle adhesion to the convex form of fishes bodies and the fine details found upon the fin and tails. Because *sumi* ink is finely ground and easy to apply it picks up the textures and distinguishing features found on the surface of the fish, resulting in a detailed, life like, copy.

In the first part of this chapter, I explore paper, particularly Japanese paper called *washi.* Although other substrates are used in *gyotaku* techniques such as finely woven fabrics of silk, cotton, rayon, and polyester I emphasise the importance of paper in *gyotaku* printing techniques and highlight the fact that the oldest *gyotaku* extant were made on paper. Paper is an extremely versatile substrate that has historically played a central role in the cultural, domestic and spiritual aspects of Japanese life:

> "Its aesthetic of simplicity, purity and tranquillity mirrors a fundamental aspect of Japanese culture itself. Historically, *washi* was used in the structure of the home on *shoji* (wooden latticed frames used as windows) and on *fusama* (paper-covered wooden frames used as sliding partitions). It was used for making decorative screens, umbrellas, clothing, lanterns, fans, kites, dolls, storage boxes, string, hats and raincoats. It was used in the tea ceremony, in Shinto worship and ritual, and for copying Buddhist sutras. It was the dominant support for calligraphy, which held an elevated cultural and philosophical

> position through its ability to reveal the cultivation and character of the creator. And, of course, as in the West, it has utilitarian uses in correspondence, record keeping, printing and publishing. While some of the traditional uses have diminished or vanished over the years, *washi* is still a deeply evocative and significant material, craft and art form in Japan" (Casserley, 2013, p.6).

Washi can be used in all three *gyotaku* techniques. However, it is important to investigate the structure and characteristics of paper in order to understand why particular types of paper are more suitable for *gyotaku* than others. I explain what *washi* is and present various definitions of paper. The differences between the production and ingredients of Western handmade papers and Japanese *washi* are examined. In the remainder of the chapter I outline the history of Japanese papermaking and explore the differences between *washi* and Western handmade paper. I establish the bond of mutual dependence and evolution within *gyotaku* techniques and Japanese papermaking. The significance of contemporary *washi* is discussed and the appreciation of *washi* as a living art form.

The spread of knowledge and practise of *gyotaku* to America was not accompanied by the ready availability of Japanese materials and this led printmakers to experiment with the papers, inks and tools available in their own country. Even though some Japanese and Chinese materials became available in specialist outlets and shops based in various 'China Town' districts in the USA it was not until the l980's that the importation of these products became more common and Japanese papers and *sumi*-e inks began to be sold in art materials shops and specialist paper merchants. It is interesting to note that Eric Hochberg's first ever *gyotaku* print made on the 9 January 1968 was a purpleback flying squid, *Sthenoteuthis oualaniensis* printed on typing paper using the direct *gyotaku* technique and the natural squid ink pigment (Figure 100).

A number of studies in the field of Japanese paper and printing inks exist, although the connections between these materials and the development of *gyotaku* printing have not been adequately examined.

Figure 100 - Purpleback flying squid, *Sthenoteuthis oualaniensis.* Collected on the 9 January 1968 in Mexico, the Gulf of California off Cabo San Lucas using a dip net at the surface. Printed on the research ship R/V Thomas *Washi*ngton using typing paper and the direct *gyotaku* technique with the natural squid ink pigment on the 9 January 1968. Image size, 17.8 cm width, 25.4 cm height. Image courtesy of Professor Emeritus Eric Hochberg.

6.2. What is *Washi*?

Countries around the world have developed their own particular practices for the manufacture of paper as a results of cultural and aesthetic requirements, the climate and the available vegetation. To discern the differences between *washi* and other forms of paper particularly those produced in the West it is first necessary to explain what it is, to avoid confusion caused by different languages and the lack of knowledge regarding different cultures. To understand why *washi* is ideal for *gyotaku* printing it is necessary to explore the organic material from which it is made, how it is made and the main differences from Western or European handmade paper. To gain

an insight into the importance that *washi* played in everyday Japanese life and the symbiotic relationship this material has with Japanese culture it is essential to describe its history and to establish how this may relate to the origins of *gyotaku*.

A simple definition of *washi* is a Japanese paper historically made by hand, consisting of a deposit of plant fibres which have been broken down and felted onto a screen from a water suspension. However, since the introduction in Japan of Westernised machine papermaking during the second half of the nineteenth century the word *washi* gradually became a generic term used to describe Japanese papers made in a traditional manner by hand or machine with the addition of wood pulp and various chemicals. An example of the modern usage for *washi* is found in the ninth edition, 2010 issue of the Hiromi Paper Inc. (p.4) catalogue which states:

"*Washi* is a Japanese paper made either by hand using traditional methods, or by machine"

However, the word *Yoshi*, which literally translated means foreign paper, is a Japanese term which came into use during the Meiji period. *Yoshi* differentiates traditional *washi* from the introduced machine-made papers. To an untrained eye some machine-made papers have a similar appearance to *washi*. The Japanese word *washi* is derived from the prefix *wa* meaning Japan or Japanese and *shi* which means paper. The suffixes-*kami* and -*gami* are often interchangeable and mean any kind of paper. "Kami is one of many homonyms in Japanese and it can mean both paper and deity (or god)" (Denhoed, 2011, p.10).

Some English speaking people use the term *rice paper* when they refer to any type of Chinese, Indian or Japanese paper. This term is very misleading as many people think that such papers are made from rice or that rice plays a role in their manufacture. In fact in Japan only a few papers such as *wara banshi*, used as a practice paper for calligraphy contains rice straw *wara* which acts as a cheap filler fibre comparable to wood pulp. Several theories exist relating to how the rice paper misnomer is thought to have occurred. One theory is that sailors brought beautiful Chinese

paintings of birds, fish, butterflies and costumes with them to England and New England. Both the Europeans and Americans thought that these paintings were made on genuine paper and not being certain about its fabrication named it rice paper. These paintings were in fact made on a substrate known as *Kung-shu* in China (*Tetrapariax papyriferum)* which has an appearance similar to that of paper and was highly prized by painters (Heller, 1978). An alternative theory exists that in 1927 a British government official mistook Japanese *gampi-shi* for another paper then popularly known as *rice paper.* Both papers are very similar in appearance; they are slightly brown and are very thin and translucent. *Rice paper* cannot be classified as a true paper because it consists of thin sheets cut spirally from the inner pith of the Taiwanese tree *Tetrapariax papyriferum* formerly known as the *Fatsia papyrifera* plant (Needham & Tsuen-Hsuin, 1985). Also known as the *tsuo* plant the slices were sometimes called *tsuo paper.* Dard Hunter gives a clear and concise description of paper as follows:

> "To be classed as true paper the thin sheets must be made from fibre that has been macerated until each individual filament is a separate unit; the fibres intermixed with water, and by the use of a sieve like screen, the fibres lifted from the water in the form of a thin stratum, the water draining through the small openings of the screen, leaving a sheet of matted fibre upon the screen's surface. This thin layer of intertwined fibre is paper" (Hunter, 1978, p.5).

Therefore, substrates such as *papyrus* made from the *Cyperus papyrus* a sedge plant which is native to Egypt, *tapa* made from the inner bark of the mulberry tree and the paper like substrates produced from the inner bark of the mulberry, fig and cannabis in Mexico and Central and South America such as *amate, amatl* and *huun* are not classified as true papers. Although they are made from vegetable fibres which are beaten or softened these are not reduced to individual filaments and macerated during the processing and their pulps are not sieved through some form of screen. More accurately their fibres are elongated and can be classified as a form of laminated material (Cave, 2010).

At this point I need to clarify that although I agree with Hunter's description of paper in general I believe it still does not accurately describe *washi.* Therefore, the following description made by Sukey Hughes should be taken into account:

> "most significant is that the fibre is vegetable; that it is processed until broken down into separate filaments; and that the sheets are formed by some sort of sieving process, usually with a mould bearing screen, which is submerged into a liquid pulp of these fibres and the excess water allowed to drain through the screen. This describes paper as it is made today and how it has been made since its inception in China nearly two thousand years ago" (Hughes, 1978, pp.37-38).

Evidently, one of the main differences between *washi* and Western handmade paper is the fibre used. Fibres from cotton or linen rags are often used in Western papermaking. Although the rags are composed of so-called plant cellulose they are materials which have already undergone a form of processing and are then broken down to make paper. In the manufacture of traditional handmade Japanese *washi* only the original vegetable fibres are used which are then broken down to make paper. Modern machine made *washi* may include cheaper fillers such as wood pulp but the main ingredients will be vegetable fibres. These fibres have longer filaments than those which have been macerated for Western papers and explains why the very thin, lightweight and flexible sheets or rolls of *washi* paper is incredibly strong, even when wet. Such characteristics are highly desirable in papers used for creating *gyotaku* impressions.

6.2.1. The Main Ingredients of *Washi*

In theory, paper can be made from any type of vegetable fibre providing that cellulose is present. Early *washi* was made from the fibres of plants found growing in Japan including several varieties of bamboo and hemp, *Cannabis sativa,* one of the oldest known paper making plant fibres. However, there are three main fibres *kozo, gampi* or *mitsumata* which are still used today for both *plain washi* and machine made *washi* and which are suitable for *gyotaku* printing.

6.2.2. Plain *Washi*

> "This term refers to undecorated, undyed *washi* that contains *kozo*, *gampi* or *mitsumata* fibres and virtually nothing else. In its unembellished state the quality of the paper making is particularly evident, as is the nature of the fibres themselves. A stack of white *washi* may initially look like a pile of identical sheets, but it takes very little time to appreciate the differences in texture, colour thickness, density and fibre dispersion" (Casserley, 2013, p.38).

Historically, papers in Japan are often given the name of the village or district in which they are produced with the type of paper or the ingredients from which they are made. For example *Mino-gami-shi* is the term used for all plain *kozo* papers made in *Mino* in the *Gifu* prefecture in Japan. The papers which I selected for my experiments, documented later in chapter eight, where chosen because they contain the three main bast fibres *kozo*, *gampi* and *mitsumata*. However, not all the types of Japanese papers used for the experiments in this thesis are handmade but are those which are easily available, reasonably priced and are popular with today's *gyotaku* printers.

6.2.3. Kozo

Paper makers use the word *kozo* (Figure 101) loosely to describe several genera of the mulberry (family Moraceae). Several species are cultivated and also grow wild throughout Japan. It produces long thin fibres which are ideal for printing papers as they neither shrink nor expand. Traditionally *kozo* found in Northern Japan was best suited for making papers used in *hanga*, (woodblock printing) and *Shoji* (latticed windows and screens). The Japanese often refer to *kozo* as having masculine qualities because it is the strongest and roughest fibre used in paper making.

Figure 101 - *Kozo* plants growing in Japan. Image courtesy of http://www.tofugu.com

The main species used in the fabrication of *washi* are *Broussonetia kanjinoki* also referred to as *Broussonetia kazinoki.* This is a small tree which is thought to be indigenous to Japan although it may have originally been introduced from Taiwan (Narita, 1954). In ancient times it was used for weaving textiles. It grows to a maximum height of nearly five meters. Considered to be the best fibre for paper making its fibres are slightly shorter than *Broussonetia papyrifera* commonly known as the paper mulberry. This tree grows up to 15 meters in height. As a native of Burma, China, Thailand and Polynesia its bark was used to make *tapa cloth.* This is one of the substrates listed earlier which are not considered to be true papers. Both species of *kozo* are harvested annually and will yield growth for approximately twenty years. The parent tree is started from a root or plant cutting and after two years it is ready for the first harvest. The shoots from these stumps grow faster than *gampi* or *mitsumata* and average two meters in height per year with a two centimetre diameter at the base. Harvesting is performed either in spring before the leaves start to grow or in the autumn when the majority of the leaves have fallen. The demand for *kozo* fibre has recently increased as *washi* production is currently experiencing resurgence in Japan leading to imports from Korea. Papers which contain a high percentage of *kozo* are ideal for *gyotaku* as they have an exceptional

wet strength and can be moulded to the body of an aquatic or other specimen easily without the risk of tearing.

6.2.4. Gampi-shi

There are eight or nine species of *gampi* (Figure 102) shrubs which belong to the Thymelaeaceae family and are reputedly suitable for papermaking. Unlike *kozo* this plant is extremely difficult to cultivate and is becoming scarce in Japan. It only grows in the central and Southern regions of Japan.

It is harvested from plants that are three or four years old up until they are ten years old between February and May depending upon the climate. *Gampi-shi* is a generic term for *washi* made from pure *gampi* fibres (Farnsworth, 1997). It was one of the earliest papers made in Japan during the Nara period (710-794 CE). Some of the most expensive papers are made from *gampi*. However, Awagami Papers in Japan make a reasonably priced paper which is recommended for printmaking and consists of ninety percent Philippine *gampi* fibres and ten percent wood pulp and has been tested in the present thesis. Some paper makers consider that *gampi* imported from China, Korea and the Philippines is of a lower quality to native Japanese varieties. Papers made from *gampi* have a smooth and lustrous appearance due to the fine, long and slightly shiny fibres. Although papers made from *gampi* are strong the fibres are less robust and at approximately four to five millimeters length on average, are shorter than the average *kozo* fibres that are twelve millimeters. Some experts claim that *gampi* papers will last forever as a consequence of a bitter chemical in the fibres that deters paper eating insects and also its resistance to damp.

Figure 102 - *Gampi* plant. Image courtesy of http://www.awagami.or.jp

6.2.5. Mitsumata

Similar to *gampi*, *mitsumata* fibres also contain an insect repellent. Part of the Thymelaeaceae family *mitsumata* (Figure 103) belongs to the genus Edgeworthia. In terms of Japanese papermaking this plant represents a relatively recent addition to the main sources of fibre. Shuzenji in the Izu Peninsula was one of the first places to use it in papermaking in the late 1500's (Hughes,1978). It is mainly grown in central Japan and the island of Shikoku. The fibres are shorter than *gampi* or *kozo*, on average three millimeters. Therefore, *mitsumata* fibres are much weaker than either *gampi* or *kozo* but it produces a slightly denser, shinier, crisper paper than *kozo*. Today *mitsumata* is mixed with a small amount of bamboo fibres, straw, cotton or recycled papers to make *gasenshi* paper a soft, absorbent paper primarily used in *sumi-e* and calligraphy (Nan & Xiaoli & Young, 1997). When mixed with wood pulp it is used to create a modern machine made version of *torinoko,* a highly refined paper, originally made of only *gampi* fibre with an eggshell appearance. *Torinoko,* was chosen as the finest paper, over the English Kent paper for the writing of the Treaty of Versailles.

Figure 103 - *Mitsumata*. Image courtesy of http://www.eskulan.com

6.2.6. Mucilage

It is not only the bast fibres which make *washi* distinct from other types of paper but also the substances which are added to the fibres in the vat. One of the most significant ingredients of *washi* and one which is not used in Western handmade papers is mucilage. It is often called *nori* or *neri* which roughly translates as 'glue' or 'starch'. This is rather misleading because it does not behave like either. It is a viscous substance which acts as a binder. When added to the vat it prevents the fibres from clumping together and assists them in floating evenly upwards and enables thin, even sheets to be formed because the water does not drain so quickly from the mould. Papers can be stacked in a pile as they do not stick together and once the paper has been formed and dried the mucilage becomes invisible (Barrett, 1983). Because specimens for *gyotaku* are often covered in their own natural mucous it is essential to thoroughly clean and dry them before an impression is made and the subject comes into direct contact with the paper. The papers used for *gyotaku* cannot contain any form of glue or sticky coating as this would interfere with the absorption of ink and the removal of the paper from the specimen.

6.2.7. *Tororo-aoi*

Several plants are used for making the mucilage. However, *Tororo-aoi* which belongs to the mallow family Malvaceae of the genus *Abelmoschus* (Figure 104), is considered the most popular type of mucilage. It is an annual plant sewn from seed in the spring and the roots are harvested before the first frost in November or December, depending upon the climate. Paper makers hung these in the eaves of their houses to dry but with modern methods a preservative solution is used. Several varieties of tororo-aoi and related plants are now often used for making mucilage and include the Hollyhock, *Althea rosa* and the Marshmallow plant *Althaeea officinalis*.

Figure 104 - *Abelmoschus moschatus* Medik plant. Image courtesy of http://www.khartasia-crccmnhn.fr

6.2.1. *Nori-utsugi*

The second most popular type of mucilage is called *nori-utsugi*. It is made from Hydrangea trees *Hydrangea floribunda* and *Hydrangea paniculata* (Figure 105) which take several years to grow. *Nori-utsugi* is often used on woodblock printing papers such as *Hosho*. Echizen is a papermaking area north of Kyoto in the Fukui prefecture and is famous for its high quality *Echizen Hosho* which has been in production since the 14th Century (Turner, 1991).

Figure 105 - *Hydrangea paniculata*, Siebold. Image courtesy of http://www.khartasia-crccmnhn.fr

6.3. The Production Process of Handmade *Washi* and Handmade Western Papers

Another key component of *washi* is the production process. Many contemporary paper makers buy their bast fibres from a supplier, but it is still possible to find small groups of people who work as a team to harvest and strip the bark in the traditional manner. The preparation process

of bast fibres is time consuming and labour intensive as it is only the white inner core of the plants which are used.

Approximately one hundred kilograms of harvested tree may produce five kilograms of paper. There are some regional variations in the production process and types of tools used. Although the general production process for the three main fibres resembles that of *kozo* fibres for handmade plain *washi*. In the case of *kozo* it is harvested then cut into approximately one meter lengths and tied in bundles and steamed. All traces of the black outer bark have to be stripped away along with the green skin underneath to reveal the inner white core. This is washed in cold running water. At this stage the fibres can be hung in the sun to dry and are called *shiorkawa,* 'white bark'. Once completely dry the fibres can be stored before further processing is necessary (Dawson & Turner, 1995).

Once the next stage of the paper making process has begun it must be continued until the process is completed or there is a risk of mildew forming. The white bark is soaked for approximately twelve hours then boiled and an alkali solution added. In ancient times this would have been potash made by running water through ashes. By the 1920's it was common to use caustic soda (sodium hydroxide, NaOH) or soda ash (sodium carbonate, Na_2CO_3). After boiling the fibres are washed again and if this is done in a stream it is called *kawa-zarashi* stream bleaching (Hughes, 1978). This process involves damming the stream and then immersing the fibres in the water either bound together or in bamboo baskets. The fibres remain immersed in stream water for approximately half a day in the summer or two or more days in the winter. A clean source of water is vital for making *washi*. However, in ancient times bleaching could be performed in the sun by simply laying the fibres outside or even performed in areas which had no running water such as Nigata prefecture which has plenty of snow so fibres were laid out on it and partially buried. Each area of Japan has its own natural resources which are exploited for paper making and this has

resulted in different characteristics and types of paper from region to region. In some areas of Shikoku there are rich limestone deposits in the rivers which help to whiten or bleach the fibres further. Stream bleaching is a method which has virtually disappeared as chemical bleaches are cheaper and quicker. Once the fibres are bleached using one of the methods described it is then essential to remove any impurities. These are picked out by hand (Figure 106). Some paper makers who produce machine made kozo still employ hand pickers as there is still no automated process which has proved as proficient (Hiromi Paper Inc, 2010). Picking is usually done in cold water to prevent spoilage of the fibres. The fibres are then beaten (Figure 107) or more accurately loosened to keep the filaments long.

Figure 106 - Removing particles from *kozo* fibres by hand. Image © Agency for Cultural Affairs, UNESCO.

Figure 107 - Beating *kozo* fibres. Image© Agency for Cultural Affairs, UNESCO.

The prepared fibre is stirred into a vat of water first by hand then with a bamboo stick and to ensure an even distribution it is then combed through using a tool similar to a large wooden rake, called a *mazé.* The mucilage is added gradually by pouring it through a cotton bag strainer to avoid any particles from contaminating the vat and it is stirred in thoroughly.

6.4. Japanese Handmade Papermaking: *Nagashi-zuki*

Sheets of *washi* unlike Western papers are most frequently made by an individual person and only when large sheets are fabricated are two or three people required. Generally the paper making mould is supported on a pulley system which means that the physical burden of making paper is lessened. It is claimed that the *kansei,* roughly translated as the character of the paper maker can be seen in each sheet: Barrett believes that "A skilled paper maker is a pleasure to hear as well as to see." and claims that "Paper makers from the same shop can identify, with eyes closed, the person at the vat on the basis of the characteristic sounds alone" (Barrett, 1983, p.62).

Washi is formed on a Japanese paper mould called a *Sugeta.* A bamboo frame with a handle either side is called a *keta.* The *Su* is a flexible bamboo or reed screen which fits into the *keta* and is

held in position by a hinge. To avoid the 'laid lines' and 'chain lines' which result from the impression made by the bamboo or reed screen a layer of silk can be placed on top called the *sha*. A sheet is formed in a different manner from Western handmade papers. The *sugeta* is dipped into the vat by the paper maker holding the two handles of the *keta* and the solution is quickly tilted over the mould (Hunter, 1978). The excess jumps off the far side away from the paper maker. Without pausing or hesitation more solution is quickly scooped up from the vat and is sloshed back and forth and a few times from left to right. Gradually the excess water drains through. This cycle can be repeated several times depending on the thickness required and the type of paper being produced. The fibres gradually build up on the mould to form a sheet of paper. This means that *washi* has little or no grain direction which gives more stability to the paper. In the Western process the vat-man only scoops up enough solution required to make a particular sheet in one go. This part of the paper making process is quicker than the Japanese procedure. Once a sheet of *washi* is formed in the vat (Figure 108) the paper maker unlatches the hinge and opens the *keta*. The *su* is carefully picked up and lowered onto a table with a rolling motion until it lies evenly and flat on top of the table.

Figure 108 - Making a sheet of *washi*, (two men cleaning bast fibres by hand can be seen in the background). Photograph by Rina Aoki. Courtesy of the Echizen Washi Village, Echizen, Japan.

This process continues and each sheet is aligned on top of the previous. There is no need to use felts to separate the sheets as in Western paper making. At the end of the day the pile of wet papers is allowed to stand and drain overnight. The next day this may be pressed, slowly increasing the pressure. The damp sheets are gently peeled off and brushed flat onto a heated board indoors or onto wooden board outdoors to dry in the sun. At this stage each sheet has four deckle edges. This may be left or the sheets may be cut into smaller sizes. These are then graded and prepared for sale.

6.5. Forming a Sheet of Western Handmade Paper

There are distinct differences in the Japanese production process and tools for handmade paper compared to the European or Western process. For example, producing a sheet of paper in the Western tradition is not a performed by a single person but requires two or three people who each perform a different task.

The vat-man dips the mould with a deckle placed on top into a vat of steam heated pulp and pulls up the mould with a shaking action left to right and back and forth. The fibres settle in four different directions as the excess water drains away. The vat-man removes the deckle and passes the mould to the coucher who flips the mould over onto a damp felt blanket. If a third person, the layman, is working he is responsible for removing the individual sheets from the felt and placing them in a neat pile to be pressed to remove more water. The layman then returns the felts to the coucher. If a layman is not available these tasks have to be performed by the coucher (Turner, 1991)

European papers are often dried indoors suspended in the air which means that further pressing is required to form a flat sheet. Britain's last surviving handmade paper mill is in Wells, Somerset:

> "The earliest mill at Wookey hole (for grinding corn) was recorded in the Domesday Book of 1086. By 1610 it was already a paper mill, and to this day handmade paper is still made from raw cotton at Wookey Hole Mill, using original Victorian machinery" (Wookey Hole, n.d.).

Today the Wookey Hole Paper Mill (Figure 109) is one of twenty attractions which form the Wookey Hole tourist attraction. This includes the famous Wookey Hole caves, the valley, and cave-aged Cheddar Cheese making.

Figure 109 - Wookey Hole Paper Mill, UK. (Left) Vat-man teaching a child to form a sheet of handmade paper; (Right) handmade paper drying in the racks. Images in the public domain.

6.6. *Washi* Dimensions

No standardised system for determining the dimensions of *washi* exists. The dimensions and weight of a sheet of *washi* varies with the type of paper, the area in Japan in which it was produced and the era. The number of different types of *washi* produced, the fact that many of these papers are no longer made and that new ones are being introduced by a modern generation of paper makers, means that it is not possible to make a comprehensive catalogue of *washi* and to list their dimensions. However, *Hosho* paper which has been made in the same way for centuries are unique

in that it has the only recognised and named *washi* dimensions. It has consistently been used in traditional *ukiyo-e* woodblock printing because of its stability with water based inks. Sheets measure approximately 39.4 cm by 53 cm and are called *obosho*. When cut in half the sheets are called *oban* and measure approximately 26.5 cm by 39.4 cm and if the sheets are halved again they are called *chuban* (Mirviss & Carpenter, 1995).

6.7. The Japanese Paper Goddess Kawakami Gozen

Kawakami Gozen is the only recognised paper deity in Japan. Every year a festival called a *matsuri* in Japanese, is held over three days in the Echizen *Washi* Village to celebrate the Goddess and her gift of introducing papermaking to the local farmers. There are other *matsuri* festivals which incorporate paper most notably the *Kanto Matsuri* in Akita and the *Nebuta Matsuri* in Aomori. Also, local festivals are being renewed in various locations in Japan which significantly incorporate *washi* such as the Ogawa Traditional Star Festival. However, the origins of the Echizen paper *matsuri* are unknown but historical records indicate the festival already existed in the eighth century (Denhoed, 2011). The Okamoto-Otaki shrine (Figure 110) was built in 1843 and was recognised as an important national treasure in 1984. A thriving mixed shrine-temple site existed at the same location in 719 which consisted of forty eight buildings (Booth, 1991).

According to local legend a beautiful woman appeared beside the river and taught the local farmer to make paper. When the people asked her why she had done this she replied that she took pity on them because they did not have rice fields but the river water was clean and pure so they could make their living by making paper. Echizen in the Fukui prefecture is approximately 100 km north-north-east of Kyoto and has been known for its high quality papers since the fourteenth century. Today, it is estimated that in Echizen there are more than 300 people involved in paper

production. There are sixty seven paper mills in Echizen mostly run as family businesses. Each mill produces its own special type of paper.

Figure 110 - Okamoto-Otaki Shrine which houses the deity Kawakami Gozen, the paper godess. Photo by Rina Aoki with permission of the Echizen paper village, Japan.

6.8. A Brief History of *Washi*

Before the 1800's when Western influences were rapidly absorbed by Japan *washi* was closely related to every aspect of cultural, domestic and spiritual life. It was a fundamental material in architecture, clothing, arts and crafts, household items, the tea ceremony and Buddhist and Shinto rituals. Similar to the majority of traditional materials and techniques relating to *gyotaku*, paper is also thought to have been introduced to Japan from China whose recorded history dates back more than 3,500 years. The earliest sheets of paper produced in China are frequently attributed to Cai Lun / Tshai Lun / Ts'ai Lun courtesy name Jingzhoung, early in the second Century B.C.E. It is not certain if Tshai Lun was the inventor of paper or simply the court official who reported it to the Emperor and so became the patron of papermaking. However, Joseph Needham reports that

"On the origin of paper, reports and studies of new discoveries of what are now the oldest known paper specimens, identified with the former Han period, have not only pushed back the date of invention at least two or three hundred years before Tshai Lun, but also confirmed that early papers were made of hemp and not of silk fibres" (Needham & Tsuen-Hsuin, 1985, p.14).

It is a common assumption that silk was one of the first fibres used in China for papermaking and that the invention had links to silk weaving and wool felt making an art that antedated weaving.

A Buddhist monk called Doncho or Dokyo (Tam-chi in Korean) was reputed to have brought papermaking to Japan. Due to the profound influence of China in shaping Japanese society and culture it is reasonable to assume that items such as Chinese manuscripts had probably reached Japan via Korea before the actual knowledge of production was known. Doncho was not only a monk but also a physician and was well versed in ink and papermaking. He became chief physician to the Empress Shōtoku and one of her most trusted advisor's. It is recorded in the *Nihon Shoki,* a Japanese history book[47] compiled in 720 C.E. that papermaking started in Japan around 610 C.E (Hunter, 1978). Crown Prince Shōtoku (regent 593-622 C.E) was actively interested in Buddhism and recognised that paper would have tremendous implications on Japanese culture, enabling images of Buddha and prayers to be transcribed onto paper and distributed amongst the people. He encouraged the cultivation of hemp plants and mulberry trees. Shōtoku also promoted experiments with various fibres and techniques to improve the quality and ease of paper production.

Although it is documented that papermaking came from China, several theories exist relating to the origins of printing. In 1966 the Spotless Light Dharani Sutra was discovered inside a South Korean pagoda of Bulguska Temple and some believe this is the oldest example of printing.

47 Nihon Shoki is a Japanese history book, written in the early Heian period and includes the most complete extant record of Japan's ancient history.

Others argue that this was actually printed in Luoyang, China and sent to Korea. Before this discovery some scholars had claimed that the earliest prints on paper were produced in Japan. Empress Shōtoku sponsored the printing of a million Buddhist prayers on paper each one housed in an individualwooden receptacle shaped like a pagoda (Figure 111). This was completed in 770 C.E, after six years of work by a team of artisans. The printing method has not been determined but some scholars believe that it was made from some form of block either porcelain, metal or wood. Traditional Chinese and Japanese woodblock printing makes use of the side grain rather than the end-grain that is characteristic of Western woodcut printing (Ross & Romano & Ross; 1990). Therefore, it is possible that the four Buddhist prayers were carved from only a few woodblocks as each individual block could withstand thousands of impressions and the actual printing would have been a quick process. Rubbing's made on Chinese and Japanese papers, in common with calligraphy, were always made on one side of the paper, due to the translucent quality, absorbency and softness of such papers. The printed prayers copied this method and only one side of the paper is printed. It is important to note that this demonstrates that the printing was adapted to the paper rather than modifying or procuring a different type of opaque paper which could have been printed on both sides as in the Western tradition.

During the Nara period (645-794 C. E.) paper was being made in several different provinces. The demand for paper grew as Buddhist copied sutras, literary pursuits became popular with the nobility and government officials were involved in nationwide census reports and taxation records.

Figure 111 - A wooden pagoda style container holding Buddhist printed prayers. Image ©2004-2013, Jeremy Norman & Co. Inc.

Papers were sent by each district to the central government and the *Kuraryõ*, the keeper of the imperial store house where the emperor's gold, silver and curios were held. This 'tribute' paper was used to demonstrate the loyalty of a particular district and in return received protection from the government soldiers in times of war.

In the eighth or ninth century the Zushoryo (the library department where the Emperors books, drawings and paintings were held) had its own paper mill with a guild of expert paper makers. They introduced these skills to neighbouring Kyoto in 807 C.E. which set up its own mill called Kamiya-in or Kanya-in. Expert paper makers were employed there for the sole purpose of supplying the court and government. It is thought that *nagashi-zuki* the traditional method of making handmade paper was developed there (Rudin, 1992).

Japan's central administration and the Zushoryõ went into decline during the Heian period (794 – 1185). The slave-like guild of paper makers that had previously been kept separate from the common people was gradually integrated and the entire Imperial staff were reduced in numbers and skills. The owners of private estates established their own small paper mills and encouraged the former Zushoryõ paper makers to resume their work. The only materials used for papermaking in Japan up until this time were *kozo, gampi* and hemp (*Cannabis sativa)*. In 1031 it was recorded that waste paper was re-made into sheets and this recycled paper with a slightly grey tint became known as *kamiya-gami* (Hughes, 1978). The demand for re-cycled paper continued and guilds were established which came from the hereditary officials of the Zushoryo, the Togai family and the Osaji family. Both families had access to old documents and books which were used in this re-cycled paper. By the end of this era provincial paper mills had become an important cottage industry with entire families taking part in *washi* production during the fallow times of their usual agricultural activities. Small papermaking villages were becoming increasingly wealthy as it became easier to distribute their papers as the road system improved.

The Kamakura period (1185-1333 CE) witnessed a move in political power from the capital, Kyoto, to Kamakura. Zen Buddhism became central to Samurai philosophy and activity. Literature and art thrived in the Zen monasteries and within the Samurai families creating an even greater demand for paper. In conjunction with this plain paper was also used for clothing (Kennedy, 1990).

Tremendous economic growth occurred at the beginning of the Muromachi period (1392 – 1573 CE). Restrictions imposed by the feudal system of society prompted the formation of guilds for craftsmen like paper makers and for specialised merchants. The guilds had close associations with noble families who acted as their patrons and paper-making thrived.

The first reports of Japanese paper money dates from 1620, the Edo period (1615-1868). It was during this time that paper became the source of the second highest income from tax for the Japanese government. The highest income was from the tax on rice. Paper was produced in vast quantities at this time and became accessible to all classes. Book publishing, woodblock printing and *wotoji* (traditional Japanese book making) increased due to the abundance and variety of papers available (Kornicki, 2000). By the end of this period *washi*, especially in the form of decorated folding fans were being presented to the heads of foreign nations with whom Japan conducted trade. The Dutch were thought to have been the first to bring *washi* to Europe. Later the Jesuit missionaries used *washi* to print their books in Japan and were responsible for the further spread of *washi* to Europe. Sukey Hughes affirms, "Bunshō Jugaku wrote in his *Paper-Making by Hand in Japan* (Tokyo: Meiji Shobō, 1959)*"* those who visit the Rijiksmusem in Amsterdam today, will find there some Rembrandt's etched out on Japanese paper, and be impressed by the good taste with which he chose only the best papers for his purposes" (Hughes, 1978, p.46). Towards the end of the seventeenth Century a German scientist named Engelbert Kaempfer went to Japan with a Dutch trade missionary. He persuaded the authorities to allow him to record the techniques for making *washi*. He published his results in Germany as *Amoenitatum Exoticarum* in 1712 and posthumously in English in 1728 under the title *The History of Japan.*

6.9. *Washi* from the Nineteenth Century to the Present Day

Another major undertaking in the foreign study of *washi* was made by an English man, Sir Harry Parkes and his team of consular staff at the British Embassy in Japan. This report was requested by the then Prime Minister William Gladstone. In 1871 it was published as *Reports on the manufacture of paper in Japan.* It was the first comprehensive study made by non-Japanese, containing over four hundred sheets of *washi.* The report and collection is of major importance because it recorded the Japanese name of each sheet of paper, its origin, the current price, methods

of manufacture and function (Webber, 1995). The main part of this collection called the Parkes Paper Collection is currently housed in the Economic Botany Collection at the Royal Botanic Gardens, Kew (Figure 112) and the Paper Conservation Laboratory of the Victoria and Albert Museum in London.

Figure 112 - Handmade *washi* embossed and coloured to appear like leather, from the Parkes Collection at the Royal Botanic Gardens, Kew. Image courtesy of http://www.sequinsandcherryblossom.com.

By the second half of the nineteenth century Japan ceased to be a closed country and the outside world became more aware of *washi*. "In 1873, at the Vienna World Exposition, western people were surprised to see various commodities made of paper, such as parasols, rain umbrellas, folding fans, and fabrics made from *shifu*, which were exhibited by Japan" (Ono, 2011, p.9).

During the Meiji period (1868-1912 CE) the government encouraged the introduction of machine-made papers with wood pulp as the raw material. Japan at that time was the first and only non-Western country which experienced an industrial revolution (Gordon, 2003). During this period

the traditional process of hand-made *washi* declined rapidly and in 1903 Japan's government began using Western-style machine-made papers for producing the state-approved textbooks.

Despite the industrialization of paper production in Japan some of the small handmade paper mills survived until after the Russo-Japanese war in 1905, but gradually the demand and low price for paper meant only machine manufacture of paper was profitable. Some traditional hand-made *washi* paper makers tried to modify their methods which often resulted in a lower quality product. Timothy Barrett reported that:

> "In the heyday of *washi* production in the mid-1800s, before the introduction of Western culture and the paper machine, 100,000 households were making handmade paper. By the early 1950's, the number had dropped to 9,000. In 1974, a survey by the Mainichi Daily News listed 756 households still working, and the number is now, in 1983, under 600" (Barrett, 1983, p.17).

In contrast to this it states in the publication (p.7) to accompany the exhibition *Washi* the Art of Japanese Paper held at the Sainsbury Centre, Norwich, UK in 2013 that:

> "The number of paper making households decreased from approximately 70,000 in the early twentieth century to 13,500 in 1941 and to 3,500 in 1962. In the 1960's and 1970's there was a government effort to support paper making by creating designations such as Intangible Cultural Assets for certain kinds of *washi* and paper making techniques. Nonetheless, the number of recorded paper makers dropped to 886 in 1973, to 446 in 1992, and to approximately 350 in 2010" (Casserley, 2013, pp.6-7).

Despite these negative statistics it is fortunate that some paper makers succeeded in retaining their traditions and passed them on to future generations. In many ways this was helped by admirers of traditional *washi* throughout the world who began to support and protect this unique paper and manufacturing process. Dard Hunter, was in Japan in 1933 to study handmade papermaking and much of his research was included in his classic book, *Papermaking the History and Technique of an Ancient Craft.* Hunter considered that *washi* was the most superior hand-made paper. Shortly after Hunter's visit the scholar, Bunshō Jugaku formed a group based in Kyoto to study *washi*.

Meanwhile, in Tokyo the Oji Paper Company formed an association whose members later founded the Paper Museum which is currently located in Kita-ku, Tokyo. Members of the public are

able to visit and make their own sheet of *washi*. The Ogawamachi Traditional Culture Center in Saitama Prefecture also offers paper making courses and has been a well-known paper making area since the Nara period. 'Hands on' paper making experiences at the Saitama Culture Center are included in the *gyotaku* courses taught by Mineo Ryukyu Yamamoto at his International Fish Print Studio. This enables students to develop their work further by embedding *gyotaku* into *washi* as well as producing plain sheets.

After the Second World War *washi* production units dwindled to less 10,000 as many able bodied workers moved to the cities attracted by employment opportunities in factories. Industrial goods replaced items previously made of *washi* as the American model of consumerism grasped Japan. In 1968 the Ministry of Culture recognised that paper making should be protected as one of Japan's traditional crafts and the paper makers Ichibei Iwano, maker of *Echizen Hosho* paper and Eishiro Abe maker of *Gampi-shi* paper were both designated 'Holders of Intangible Cultural Assets' or as they are informally called 'National Living Treasures'.

In the early 1970's paper makers formed the National Handmade *Washi* Association to revitalise the industry and to stimulate both national and international interest in *washi.* A younger generation formed another group in 1975 that had similar aims called the National Young Paper makers Gathering. Members of the *Washi* Research Group including the scientist Machida Seishi began to study the paper documents and artefacts that were housed in the Shosoin Imperial Repository which was constructed in Nara during the eighth century. In 1974 the Ministry of International Trade and Industry passed laws to promote Japan's traditional craft industries which included *washi* (Kyoko, 2007). Major paper making regions were able to build training facilities to prevent the decline of *washi*. There were several significant publications about *washi* during the 1970's produced by the *Washi* Research Group including books by Machida Seishi, Kume Yasuo and Morita Yasutaka.

Groups of paper makers were designated as holders of 'Intangible Cultural Assets'. The Sekishuban-shi Preservation Society and the Honmino-shi Preservation Society were designated in 1976 followed by the Hosokawa-shi Preservation Society in 1978.

The 1970's witnessed an increased amount of international communication, research and the exchange of ideas within the *washi* community and foreign paper makers travelled to Japan to learn the art of *washi* and in turn published their own books. Probably the first non-Japanese to have mastered making *washi* was Timothy Barrett, in the 1970's. Thanks to the promotion of *washi* several foreign paper collections, which had previously been overlooked, came to their attention. One such collection was the Parkes Paper Collection housed in the Victoria and Albert Museum which had laid undisturbed since its arrival on the 6th of September 1871 (Webber, 1995). The Director of the Paper Experimental Station in Ogawa, Saitama Prefecture showed a photocopied document to Hans and Tanya Schmoller, paper historians who visited him in 1976. This document was considered highly valuable by Japanese paper historians as it was the only comprehensive record of *washi* during the early Meiji period. Fortunately, the collection was located in 1978. Work began in 1988 to preserve the collection, catalogue it and make it more accessible to the public.

In 1983 the touring exhibition "New American Paperworks" curated by Jane Farmer was presented at the Kyoto Modern Art Museum. *Washi* enthusiasts saw the opportunity to hold a world paper symposium to coincide with this exhibition. The International Paper Conference (IPC 83) resulted in the attendance of five hundred people from fourteen different countries. In the same year Yoichi Fujumori and his wife, Mieko started to offer one week training courses to introduce the art of making *Awa-washi*, which were available to foreign participants. Papermaking activities and courses continue there to this day:

> "Originally this event was sponsored by the Fujimori family and the Fuji Paper Mills Cooperative, but now it is sponsored by The Hall of Awa Japanese Handmade Paper. Established in 1989 this non-profit museum (also known as the *Washi* Kaikan) is dedicated to the preservation of the technique and skills of *Awa-washi* for future generations as well as the expansion, promotion and introduction of

> *Awa-washi* to the general public through workshop, demonstrations, exhibitions, Minoru Fujimori, Intangible Cultural Property of Tokushima Prefecture, The Hall of Awa Japanese Handmade Paper established in 1989, Yamakawa-cho, Oe-gun, Tokushima, Lectures, etc." (Awagami, n.d.).

Recognising a demand for quality Japanese papers outside of Japan, several well-known suppliers established their business during the 1980's which continue today. These included in 1988 'Hiromi Paper Inc., based in Santa Monica, USA and founded by Hiromi Katayama who maintains a close relationship with Japanese paper makers and *gyotaku* printmakers. 'The Japanese Paper Place' opened in Toronto Canada in 1982 and the owner, Nancy Jacobi, organised the *Washi* Summit in 2008, a celebration of the art of Japanese papers. At the same time art material shops and paper merchants began to stock more Japanese papers. 'R.K. Burt & Company Ltd.' that are based in London began trading in 1893 and is one or the largest wholesale paper merchants in the UK specialising in high quality papers for artists and printmaking. Burt's have an extensive range of Japanese papers and can provide detailed information about each one.

During the 1990's part of the Parke Paper Collection was exhibited at the Tobacco and Salt Museum in Tokyo and centred around the comparison of contemporary Japanese papers made in a traditional manner with those contained in the Parkes collection. Papers were examined for their weight, size, thickness, fibres and laid and chain lines were measured all using the Technical Association of Pulp and Paper Industry (TAPPI) standards.

In 1997 Mino, a city in the Gifu prefecture and famous for its *washi*, began the annual artist in residence program (Figure 113). This residency sponsors five international artists who spend three months in Mino learning the art of *washi* and creating their own paper art works.

Figure 113 - Mino paper village artist in residence, burning Japanese paper cranes. Image courtesy of © Richard Bolai, 2008.

Figure 114 - '*Washi*, the Soul of Japan', part of the twelve volume compendium. Image courtesy of http://www.sequinsandcherryblossom.com

A major publication which includes virtually every kind of *washi* currently made in Japan was published in a limited edition of 800 copies in 2011. *Washi: The Soul of Japan- Fine Japanese*

Paper in the Second Millennium (Figure 114) is a twelve volume compendium contains seven hundred and thirty samples of plain and decorated *washi* plus three hundred and twenty samples of machine-made Japanese paper. The text written in both Japanese and English provides detailed documentation about each paper sample (Ginsberg, 2011).

In 2013 part of the collection of larger sheets exhibitions, research, etc. were exhibited alongside a selection from the Parkes Collection at the Norwich University of the Arts Gallery and were part of a six week festival of *washi* which included two exhibitions organised by the International Association of Hand Paper makers and Paper Artist (IAPMA). In parallel with the three exhibitions a one day conference on Japanese paper was held in March 2013 and several paper making workshops. With new research, publications, and open debate about Japanese papers it would appear that *washi* has a positive future. Ibe Kyoko describes the impact that new printing technologies are having upon *washi:*

> "In the past, when printing methods became modernised, *washi* could no longer compete with the precision and low cost of machine-made paper. But today, *washi* is gaining attention as a printmaking paper by photographers and designers. The new printing technology of digital printers is more compatible with *washi* and because the ink is sprayed onto the paper, printing digitally on *washi* allows for more nuance and detail than on machine-made paper. Digital printing has opened up a new market and renewed demand for *washi*. There has also been an effort recently to include paper making in cultural education for the general public, especially for elementary school children who are given hands-on paper making experience as part of their studies" (Kyoko, 2007, p.11).

Figure 115 - Contemporary *washi* makers forming an extra-large sheet. Photo by Rina Aoki with permission from the Echizen Washi Village, Echizen, Japan.

Although *gyotaku* practitioners prefer to use plain undyed *washi* or papers which imitate the appearance of washi such as certain handmade papers from Thailand and the Himalayas, contemporary paper makers have expanded the decorative possibilities of *washi* and several *gyotaku* practitioners have created prints using *washi* with plant inclusions and other decorative elements such as metal foils. The recognition of *washi* and papermaking as a living art form (Figure 115) in Japan has altered the global market. It is not only the *washi* connoisseurs, and artists that are creating an increase in demand but also contemporary interior designers and to a certain extent, an educated public who recognise and appreciate the unique qualities of *washi*.

7. Inks

7.1. Introduction

The materials and tools used for producing *gyotaku* impressions are interconnected to the development of the three *gyotaku* techniques. The way in which the substrates mould to the print matrix, how the substrates react to certain inks and the tools with which these inks are applied all have a significant impact upon the finished print. The first part of this chapter identifies and defines the different types of inks and explains the important terms which are used to describe the different ingredients and properties of inks. A very brief outline of the history of ink is given in order to place *gyotaku* techniques in context of their interdependence upon materials.

Mass produced oil based printing inks not only affected the appearance of *gyotaku* impressions but also enabled printmakers to make minor changes and adaptations to the *gyotaku* process. Modern printmaking inks are often used in combination with Japanese papers and modern signature seals or *hanko* to imitate the aesthetics and traditional Japanese style *gyotaku*. Seals are often used today, even by people with Western names and are usually printed in red beside the *gyotaku* impressions. Sometimes a signature is added in pencil echoing the Western tradition of signing fine art prints. In this chapter the impact made by the introduction of new and different materials, specifically oil based inks and the use of silicone life form replicas as opposed to genuine aquatic specimens is considered.

A broader aim of the chapter is to address the origins of *gyotaku* and how the materials and techniques for making Chinese rubbings may have provided the impetus for fish rubbings. The

basic materials paper and *sumi* ink and the tools such as hair brushes which were necessary for creating the first *gyotaku* impressions, originated in China. A lack of early documentation means there is no precise knowledge about exactly when the quality of the *gyotaku* tools and materials became suitable for making rubbings, but as early as the Chinese Tang Dynasty ink rubbings on paper was a common practice[48]. Rubbings were made from text cut into stone and wood and were authenticated with smaller signature seals.

In chapter eight, to gain a greater understanding of how materials can influence the aesthetics of the finished print, practical experiments with a selection of modern oil and water based black inks and contemporary Japanese papers are performed. The results are interpreted to establish the suitability and ease of use of the materials for the direct *gyotaku* technique and the aesthetic outcome. Today many practitioners make use of synthetic fabrics such as rayon and polyester for very large specimens and for use in the indirect techniques. However, I chose to investigate Japanese papers as this substrate can easily be used in all three *gyotaku* techniques. Also, the earliest known *gyotaku* prints extant were all made on paper.

7.2. What is an Ink?

A general definition for ink is found in the Concise Oxford English Dictionary (Pearsall, 2002, p.729):

"**ink ● n. 1** a coloured fluid used for writing, drawing, or printing. **2** Zoology a black liquid ejected by a cuttlefish, octopus, or squid to confuse a predator: ● **v.** write or mark with ink. ► cover (type or stamp) with ink before printing. **2** informal, chiefly N. Amer. Sign and secure (a contract).

DERIVATIVES inker n.

48 Tang Dynasty 618 -907 C.E. Li Yuan the Duke of Tang seized the throne in 618 and adopted the noble title of his clan as the name of a new dynasty (Steuber, 2007).

ORIGIN ME *enke, inke,* from OFr. *enque,* via late L. from Gk *enkauston,* denoting the purple ink used by Roman *E*mperors for signatures, from *enkaiein '*burn in '."

Today, an enormous variety of inks exist for various purposes. Each ink has its own properties and has been developed over time for a particular process. Some resemble intense liquid dyes or finely ground dry pigments such as those used in certain digital processes and yet they are generically referred to as inks. The present section is concerned with exploring the different types of ink which are used for the different *gyotaku* techniques and their advantages, composition, manufacturing process, the health and safety issues of working with inks and how each ink performs. There is a great deal of confusion relating to "*environmentally friendly inks*" and "*non-toxic inks*" and this will be clarified in light of the conceptual framework ("nature printing") that frequently leads to their use for *gyotaku*. Because all the *gyotaku* techniques require a genuine specimen (or silicone life form) the inks that are commonly chosen by *gyotaku* practitioners are those which are ready made for the relief printmaker. This is because good quality oil based relief inks contain strong, finely ground, highly coloured pigments held in a vehicle or medium which traditionally consists of some kind of vegetable oil. Confusion exists around the term "*water-based inks*" as some contain a very small amount of vegetable oil such as soya bean oil. The composition of good quality water-based inks is generally very basic and consists of very few ingredients for example, high quality, finely ground pigments in gum arabic vehicle or medium.

Some oil based relief inks contain a small amount of driers usually less than one percent. Printmakers may add substances to ready-made oil based inks including; magnesium carbonate, or talc, to add stiffness, cobalt, or manganese driers, to speed up the drying time, vegetable oil, and frequently a polymerised linseed oil of 30 poise, to change the viscosity of the ink. However, additions to ready-made printmaking inks can have adverse effects if not done properly, for

example adding too much oil may result in prints which have a halo effect around the image which does not completely disappear even once the ink is dry.

For clarification the important terms used by printmakers to describe certain ingredients and characteristics of inks are outlined as follows.

7.2.1. Pigments

All printing inks contain some form of pigment and a vehicle. In simple terms pigments are black, white, coloured, or fluorescent solids which are classified as organic or inorganic. Pigments used in manufacturing printmaking inks are dry colourants, usually ground into a fine powder. Generally the pigments are insoluble and chemically and physically unaffected by the vehicle or substrate into which they are added. Traditionally pigments were referred to as organic or inorganic, relating to their origin. However, this classification no longer bears a relation to the origin of modern day manufactured pigments for example, inorganic pigments include those from natural and synthetic origins e.g.; mineral pigments of earth's and clays such as yellow ochre and raw umber, raw sienna, also, earth's and clays which are heat treated (calcined) e.g. burnt umber, burnt sienna and inorganic synthetics such as cadmium yellow, zinc white, titanium black and manganese violet (Varichon, 2006). Organic pigments also have natural and synthetic origins and include; vegetable, e.g. indigo and madder, animal or biological, e.g. cochineal, Indian yellow and squid ink and synthetic organic pigments, e.g. synthesised alizarin. Today the majority of pigments used in the printing industry and for artists paints are manufactured on an industrial scale and conform to strict regulations concerning stability, permanence and lightfastness.

7.2.2. Dyes

Dyes unlike pigments dissolve in the vehicle or medium. Dyes are less stable and more fugitive than pigments. Therefore, dyes are only used in the manufacture of artist's ink as lake pigments. “Lake pigments are derived from colours that are laked – bonded chemically to colourless, insoluble pigment. Among the more common mordants used in laked pigments are chalk (calcium carbonate) and alum (aluminium potassium sulphate – used to lake pigments since the Roman era)” (Hoskins, 2004, p.117).

7.2.3. Vehicle, Medium or Binder

Vehicles or mediums are sometimes called binders in textile printing inks and water-based screen printing inks. Regardless of which term is used they refer to the carrier for the pigment which sits in a suspension. The primary vehicle for oil based printmaking inks is linseed oil. In ancient times the process of manufacturing linseed oil was a hazardous occupation which involved boiling the oil and then burning it and so it became known as 'burnt linseed oil' (Griffiths, 1980). Currently, 'boiled linseed oil' is manufactured by heating the oil in pressurised containers and is commonly called 'stand oil'. In water-based screen printing inks the medium is an acrylic polymer although in water-based ink-jet printing the vehicle is water. In some water-based relief printing inks the vehicle is a gum arabic solution.

7.2.4. Particle Size

The size of the particles in an ink depend on the type of ink and its intended use. Commercial inks for the printing industry aim to obtain the smallest particles which create inexpensive inks as the colours are stronger. This is particularly true for transparent inks and is therefore ideal for use in four colour (CMYK) (see glossary of terms and abbreviations) printing

e.g. magazines and posters. However, the particle size for printmaking inks varies considerably. Relief inks have a larger particle size than commercial inks or printmaking lithographic inks. Tailor made printmaking relief inks are a popular choice of *gyotaku* practitioners. These inks need to be opaque and yet must not result in any residual staining or halos once the ink has been printed. The particle size of an ink affects the inks opacity and transparency, the stability, strength, colour and rheology. A device called a FOG (Fineness of Grind Gauge) is used to measure the particle size in inks. A stainless steel block with a measuring scale on the side has two shallow channels on top which slope up from approximately one millimetre to nothing in depth and approximately one centimeter wide (Leach & Pierce, 1994). To use a FOG a small quantity of ink is placed at the deepest end of the gauge and a small steel squeegee is run over the ink to the shallow end. On examination of this process the ink will reveal a point where it can no longer travel up the slope because the particles are too large. This break point can be measured using the scale on the side of the gauge and then the size of the particles in microns can be calibrated.

7.2.5. Ink Length and Flow

Rheology is the branch of physics concerned with the deformation and flow of matter. Concerning inks the flow and ink length describe the viscosity and elasticity of an ink. Once the ink has been mixed the length can be determined by lifting it with a spatula or palette knife into the air and allowing it to drop down. The speed with which the ink drops down relates to the inks viscosity. For example a thin watery ink will flow from the palette knife very quickly and therefore has a low viscosity and yet an ink with a thicker consistency similar to that of butter will drip down very slowly and has a high viscosity The elasticity or length of an ink is also an important factor to consider when choosing inks for *gyotaku.* A long ink will from threads when it is pulled up from the ink slab but a short ink has the consistency of butter and a limited flow.

7.2.6. Viscosity and Poise

Poise is a traditional system of measurement for the viscosity of printmakers inks. The range of poise for printmakers inks is from one for thin watery inks up to the maximum of seven hundred for thick, viscous inks with a butter like consistency. Commercial printing inks can be measured using centipoise or different unit systems, the SI system or International Standard unit, for measuring all liquids is newton second per square metre (N s/m^2). The SI unit for measuring dynamic viscosity is the pascal second (Pa·s) which refers to the inks ability to flow (Hoskins, 2004). The more viscous an ink, the greater the resistance it has to flowing.

7.2.7. Tack

The tack of an ink refers to its sticky consistency. Tack influences the way in which an ink adheres to the surface of the paper or printing substrate and determines if 'pick' will occur during the printing process. 'Pick' is a term used to describe the fibres on the surface of a sheet of paper which are pulled away by the ink. This problem can be encountered by *gyotaku* printers if they allow their ink to become too dry and it is particularly noticeable if it occurs when printing onto Japanese papers as their fibres are longer.

7.2.8. Adhesion

It is essential that printing inks adhere to the print surface for a successful printing result and that once printed they remain adhered to the substrate and do not flake or peel off, or crack. The vehicle of an ink is responsible for an inks adhesive qualities and the ratio of pigment to vehicle. In the case of *gyotaku* on paper adhesion occurs by penetration as paper is absorbent. If the *gyotaku* transfer method is used to apply impressions to non-absorbent substrates then it is important that the inks used can form a film that has a chemical affinity to the substrate and will easily adhere to it.

7.2.9. Thixotropic

Many printmakers inks are thixotropic which means that when the ink is agitated, stirred or as in the case of some oil based inks which are worked on an ink slab with a palette knife before rolling it out, the ink will become more fluid.

7.2.10. Drying

The drying of inks can occur in different manners depending upon the printing process, the type of ink which is used and if anything is added to the ink, the vehicle of the ink and the substrate. In the majority of inks the first phase of drying which occurs is called setting. Once the ink is applied to the paper or other substrate the vehicle or liquid in the ink begins to evaporate into the air or to penetrate the surface of the substrate. After this stage drying takes place by either absorption, oxidation, evaporation or polymerisation (Ross, et al., 1990). Absorption is the drying process when ink is applied to an absorbent substrate such as *gyotaku* on paper. Oxidation occurs in oil based inks when the oils are in contact with air and begin to form a solid or semi-solid ink film. This process can be accelerated by the addition of driers in oil based inks. Drying by evaporation occurs when the solvents in the vehicle evaporate into the air. Polymerisation often requires drying or curing by a heat or light source and is a system more common in the printing industry in which non porous substrates may be printed with specialist ultra violet (UV) inks and dried using a UV drying system. If a printmaker is working in a humid atmosphere the ink will take longer to dry.

7.2.11. Light Fastness

Despite the advances in ink technology and modern ink manufacturing inks fade over time when subjected to light. Therefore, it is essential for both the printmaker and print collector to know about the care, handling and framing of prints in order to preserve them. Printmakers inks are

measured using the international standard of the 'Blue Wool Scale'. Ink labels may carry the ISO 105-BO1 colour fastness to daylight or the more common ISO 105-BO2 which is the standard test for exposure to artificial light. A printmakers ink with score of No. 6 on the 'Blue Wool Scale' is considered permanent. The highest score is 8 and the most fugitive colours are No. 1. Some American inks use the ASTM International system, formerly the American Society for Testing Materials (ASTM). The ASTM International lightfastness scale is as follows

I - Excellent

II - Very good

III - Fair

IV - Poor

V - Very poor

The I (Excellent) rating is given to inks which will last for over a hundred years before any changes may occur. The V (very poor) rating does not apply to printmakers inks but is listed on some fluorescent coloured paints which may start to fade in ten years (Adam & Robertson, 2010).

The two main materials necessary for creating *gyotaku* are paper and ink. Each one other and it is the combination of inks and papers which needs to be taken into account in order to produce a technically competent *gyotaku* impression. The choice of *gyotaku* technique also influences the choice of ink as some or their characteristics may be better suited for a particular technique or working process. When first experimenting with *gyotaku* or conducting workshops designed for teaching children, a range of paints may be used such as gouache, acrylic, and watercolour. These paints are not discussed here as their composition and the way in which they behave are different to inks. The majority of *gyotaku* practitioners may have experimented with paints but generally prefer to work with printmakers inks. Mineo Yamamoto who enjoys *gyotaku*

printing onto synthetic fabrics and a variety of Japanese papers has produced his own ink, specifically suited to the indirect technique.

Figure 116 - California market ssquid, *Doryteuthis opalescens*. Indirect *gyotaku* on polyester fabric, using natural squid ink pigment. Size, 38 cm width, 19" 48.3 cm height. Printed in Santa Barbara, California, March 2007 by Eric Hochberg. Image courtesy of Professor Emeritus Eric Hochberg.

The natural pigments found in a variety of cephalopods have been used by a number of *gyotaku* practitioners for printing the specimens in their own ink (Figure 116). Most species of cephalopods, with the exception of Nautilidae (Blainville, 1825) and the species of octopus belonging to the suborder Cirrina or Cirrata (Gimpe, 1916), are able to produce and release ink from their ink sacs (Williams, 2011). Each species of cephalopod produces a different shade of ink. Generally cuttlefish ink is brown, octopus ink is black and squid ink is a blue shade of black. The word sepia refers to a rich reddish shade of brown and the name derives from the Latin word '*sepia*' which means cuttlefish. The main ingredients in all cephalopod ink sacs is melanin and mucus. The culinary ink is harvested from the ink sacs once the creature is dead and therefore does not contain any mucus. Squid ink can be purchased in very small packets of four grams or small five hundred gram jars (Eastaugh et al., 2001) from fishmongers or gourmet food stores and it is traditionally

used in a variety of pasta and rice dishes. Recently, squid ink has been added to ice cream in Japan to create a novelty ice cream with a dark grey colour and an unusual flavour.

Inks for writing, drawing, printing and natural inks from cephalopods have different properties, different compositions and may differ in appearance from each other. In simple terms 'to ink something' can be described as a transference and adhesion of colour in a particular shape or area onto a substrate (often paper). The colour has to be in the form of a dyestuff or pigment with a vehicle which binds the colour together and sticks it to the surface of the substrate. Inks may contain a variety of chemicals to promote or slow down drying, and to change the properties such as gloss, cracking or hardness. A good quality ink for printmakers and *gyotaku* practitioners needs to have as few additives as possible. This allows more control of the ink and a better understanding of the ingredients which are necessary to adjust the ink for the particular purpose required:

> "Why do printmakers need to know what is in their ink - apart from knowing how it can affect their health and the environment? I believe it is a great deal easier to make good art if you understand the nature of the materials you are using. Printmaking is at heart based on a technical process; although printmaking no longer bears any relation to the high-tech, large-scale commercial printing process, at some point they still link. This can be illustrated easily by referring to prints' historical contexts, as all printmaking techniques were once industrial processes. Ink and its manufacture still cross the divide between industry and art" (Hoskins, 2004, p.10)

Several interesting points are raised here. I agree that it is easier to make a good print and particularly a *gyotaku* print if you know about the inks you are using, their characteristics and how they react during printing and once printed and dried. Furthermore, as many *gyotaku* practitioners have empathy for the natural world and concerns about the environment they like to know about all the materials, particularly inks, which they are using. This includes the inks composition and any substances necessary for cleaning the inks and associated health and safety legislation or guidelines regarding particular chemicals and waste disposal. Edible specimens are frequently cleaned, cooked and eaten at the end of a printing session, and this will also influence choice of ink. However, I would disagree with the statement "as all printmaking techniques were once industrial processes" because this does not take into account *gyotaku* and many of the ancient nature printing techniques

which have never been used as an industrial process. Although, I understand the connection between the manufacture of inks for industrial processes which were then claimed by artists for producing their work such as lithography, letterpress, engraving, screen printing, etc., I examined a range of inks currently used by *gyotaku* printers. For clarification I have organised them under their brand name and the type of ink.

7.3. Chinese and Japanese Ink Sticks and Liquid Inks

Black ink sticks and small bottles of black liquid ink are manufactured throughout East Asia and are well-known in 'oriental arts'. It is traditional to make ink by grinding an ink stick on an ink stone with the gradual addition of water. Both inks sticks and liquid inks are available in various grades or qualities from practice to mid-range and top quality, high grade varieties. There is also a medical grade, non-poisonous ink, taken as a medicine in China and today used to create a range of vegan friendly, high quality, tattoo inks. Medical grade ink is used in pathology laboratories to stain surgically removed tissue specimens. The ink survives the tissue processing which involves soaking the specimens in alcohol and xylene, before embedding in paraffin wax and sectioning for viewing under a microscope (Ogborn, 2007). It is also used by microbiologists to produce negative stains. The backgrounds of slides are stained and the micro-organism remains clear. It can be used with other types of stains and is particularly useful for determining if a cell has a gelatinous capsule. Scientific collections in which specimens are often preserved in alcohol make use of this ink for the labels which can be submerged with the specimen or on a separate piece of paper. This is a versatile ink with several advantages which Kwo Da-Wei explains:

> "The superiority of Chinese ink lies in its delicate, fine, and smooth colour tone. It is transparent. It is water-proof, i.e., once it is used on the paper it becomes permanent and will last for centuries without fading. The ink on early scripts and paintings excavated from the Chu tomb in Ch'ang Sha has remained unchanged, although dating back to the 5th century B.C. The colour of the ink in the widely

> reproduced painting, *Admonitions of the Instructress, (*5th cent. A.D.) now in the British Museum , is still as fresh as ever, although the paper has turned a greyish brown" (Da-Wei, 1990, p.129).

Furthermore, this ink in the form of a dry stick is very convenient as ink can be made in the required quantity, at any time, in any location, and the intensity of the black can be altered by adding more or less water. The intensity and consistency of ink is of particular importance for calligraphers, painters and for producing stone rubbings. It would have been a very convenient ink which fisherman or Japanese nobles could easily use to make *gyotaku* prints either on a boat, or on the sea shore, or river bank.

These inks are known under different names and this has led to a similar confusion to that described for paper types (see section 5.1). For example, in Britain Chinese ink is known as 'Indian Ink'. Although this ink was made in China the materials to make the carbon black or lampblack were often traded from India and so the term Indian Ink became familiar with English speaking peoples. In China liquid ink is called *mozhi* or *moshui* and ink sticks are known as *mo.* One of the most famous inks is made from pine soot in the Yellow Mountain area of the An-Hwei province. It is called Pine Smoke of Yellow Mountain Ink. An ink produced especially for making rubbings has the brand name *Hua Shan* and has a slightly higher glue content than inks used for painting and calligraphy. The black in ancient Chinese woodblock prints was obtained from this type of ink, being particularly suited to printing on the Chinese paper *Xuanzhi*. One of the best and most well-known ink producers in China is the *Yi De Ge* Ink Corporation which produces both ink sticks and liquid ink (Xi, 2012). Some top quality ink stick brands are *Tang Mo, Tie Zhäi Weng* and *Cang Pei Shi* which are renowned for their lustrous blacks. For creating Chinese paintings with colour an alternative to watercolour paints are the Flying Dragon ink sticks (Figure 117). These can be recognised by gold dragons painted on one side of the stick, the other side has Chinese characters which translate as 'colourful ink sticks'. These colours do not behave in the same manner as the high quality brands of black ink.

Figure 117 - A box of Flying Dragon ink sticks. Collection of Lily P. Scholes. Photo by the author.

Many artists prefer old inks because modern inks are often made with chemical alternatives to black soot and the particles are larger in size and irregular. Also, many prefer to use ink sticks as the time spent grinding the ink on an ink stone helps to achieve the calmness or meditative state necessary for creating fine calligraphy and painting. Chinese materials used in these arts have a greater significance than their practical purpose. The basic materials are known as the 'Four Treasures of Study': brushes (*bi*), ink sticks (*mo*), ink stones (*yan*) and paper (*zhi*).

In Japan these black inks are called *sumi* and are used for calligraphy, *sho do,* which translates as 'way of writing', and for Japanese ink painting called *sumi-e* or *suibokuga,* which predominantly use black ink, and the later style of traditional painting called *nihonga* in which colours are used. These water-based *sumi* inks are also used in traditional Japanese Woodblock printing from the earliest mono-colour black prints to the modern day chromatic prints. When used for printmaking the ink sticks are soaked in water for three to four days. Each day the water is

changed until most of the glue has leached out. Contemporary Japanese coloured inks are sometimes labelled as *sumi inks* in English, and are available in a range of colours similar to the Chinese Flying Dragon coloured ink sticks. However, when referring to *sumi* it is generally taken for granted that one is referring to a black ink. The type of soot used in manufacturing defines the inks. Pine soot inks are called *sho en boku.* This gives a cool shade of black. Inks made from vegetable oil soot of sesame, rape seed or paulownia are called *yu en boku,* oil smoke ink. This type of ink gives a warm reddish brown shade of black. The *Boku-undo* co. Ltd. Based in Nara, has supplied Japanese artists with some of the highest quality *sumi* for over two hundred years. Other well-known brands are *Kuretake* and *Yasutomo* (Okamoto, 1997). Ink sticks made to celebrate special occasions and ornate antique ink sticks (Figure 118) are collected by connoisseurs as *objects d'art.*

Figure 118 - Antique Japanese carved ink sticks. Collection of Lily P. Scholes. Photo by the author.

7.3.1. The Main Ingredients of East Asian Inks

The main ingredients of both Chinese and Japanese inks are soot, glue and water. The soot comes from burning resinous pine in a chamber and collecting the black soot from the surfaces. Another type of soot called lampblack is the result of burning lamps filled with a wick and animal, vegetable or mineral oils and collecting the soot from the surfaces of the chamber or vessel which is used for the purpose. Different shades of black can be obtained depending upon the raw materials of the soot or lampblack. The composition of the glue also affects the appearance of the inks and depends upon the country, region and era in which the ink was produced. Many grades of glue were produced and the most common types were made from the hides or horns of deer and cows or from a mixture of animal bones (Needham & Tsuen-Hsuin, 1985). Glue was also extracted by heating the skin or bones of various fish species in water. The purest form of fish glue made from the swim bladder of fish such as the Sturgeon is called Isinglass. Lastly, the water used to extract the glue from fish bones needs to be clean and free from any detritus. Ancient recipes for inks listed hundreds of miscellaneous ingredients such as egg whites, pomegranate skins, cloves, sandalwood camphor and musk. However, the basic recipe of pine soot or lampblack, glue and water has remained the same throughout the history of *sumi* ink production.

7.3.1.1. An Overview of the Current Manufacturing Process for Traditional Japanese Ink Sticks

Firstly, obtain soot by burning resinous pine branches or paulownia oil, rape seed oil, sesame oil, etc. and at the same time melt down the bone glue by simmering it in a double boiler with water.

Place the bone glue and soot in a mixing machine and knead together until it has the consistency of jelly. The consistency and ratio of soot to glue is important in determining the quality of *sumi*. High quality *sumi* is kneaded again by hand and separated into one kilogram portions. At this stage perfume is added and the ink is placed in individual moulds to be pressed. Even a small ink stick requires at least thirty minutes of pressing. Pressing in the mould gives a particular shape, design and character to each ink stick and, once pressed, sticks need to be dried slowly as rapid drying causes them to crack and break. For drying the ink sticks are placed on ashes and the moisture level is decreased gradually over seven days for small inks sticks and up to thirty days for larger ones. After the sticks have been ash dried each one is wrapped in woven straw and hung from the ceiling or left on top of a net in a windless room to be air dried for one to two months. This also helps to prevent the ink stick from breaking when they are used. The ashes are rinsed off the sticks with water if necessary and a glaze is applied to the sticks and they are then baked over hot coals. This gives each ink stick a soft surface and the edges are shaved off by hand. These are left for up to one week before being dried again (Kanazawa, 1979). Then colouring or images are added to sticks to pick out the characters. Once all these stages are completed each ink stick is wrapped in paper and put into paper or wooden boxes. Paulownia wood is used for high quality ink sticks as it keeps the humidity at a specified level and removes moisture from the sticks after it has been used.

Making traditional inks sticks is a time consuming process but the compensation is the high quality of the final product.

7.4. Water-Based, Water Soluble Inks

In the studio work component of the thesis I chose to experiment with Akua Kolor inks for *gyotaku* as they are in some ways similar to the traditional Chinese and Japanese ink sticks and

liquid inks. They are not only suitable for printmaking but can also be used for painting, and drawing. Akua are now part of the Speedball Company. All their inks are manufactured in the USA and comply with the ASTM (American Society for Testing and Materials). Material Safety Data Sheets are available from the Speedball website and these water-based, water soluble inks are made with high quality light fast pigments and a Gum Arabic binder. No toxic dryers or hazardous ingredients are used and the consistency is a fluid liquid. The inks were developed in the mid-nineties by two printmakers who were seeking a professional quality ink without compromising their health. After experimenting with several brands, Susan Rostow and William Jung discovered there was not a single water-based ink for wiping an intaglio plate or for working over a period of time on a mono-type plate. This led to them creating two ranges of ink 'Akua Kolor' and 'Akua Intaglio'.

Another popular ink with *gyotaku* practitioners is the Speedball Water-based Block Printing ink. Like the Akua Kolor this ink is made from pigments in a vehicle, although it has the consistency of a gel. It is not considered a hazard to health and safety and is not classified as a hazardous waste. Speedball have been making a variety of inks and art materials for over one hundred years and their non-toxic block printing inks have been developed for students and professional use and provide a wide range of colours. An ink which has the consistency of a traditional oil based relief ink is made by Graphic Chemical & Ink Co. and although this water soluble ink was designed for relief printing many intaglio printmakers successfully use this product as acid resistant ground when rolled onto etching plates.

7.5. Oil Based, Water Washable, Relief Inks

A great deal of confusion arises with the names of inks. Many modern inks have been formulated to avoid the use of solvents and can easily be cleaned up with water. However, these

inks are not all water-based, they contain various oils usually, of plant origin. These inks have become popular with *gyotaku* practitioners who tend to require a slow drying time and a less viscous ink. Caligo Safe Wash Relief Inks are suitable for all kinds of relief printing such as letterpress, lino-cut, woodcut and wood engraving and contains less than one percent of driers. Linseed oil is one of the ingredients used as it is considered free of Volatile Organic Compounds (V.O.C.'s) that can damage the environment. The majority of the colours in this range are made from single pigments. Caligo Inks is an independent, family owned business based in Wales, UK. In 1999 the company was awarded the 'Welsh Small Environmental Company of the Year' award for the development of their environmentally friendly range of 'Safe Wash' inks, which hold the ISO 14001 Quality Standard for the environment. A close relationship with the Center for Fine Print Research at the University of the West of England has enabled collaboration and further development of their ink products. Dr. Paul Thurkell of the Center for Fine Print Research, UWE states

> "As a professional printmaker I like the fact that the Caligo inks are made in close collaboration with the end user. It is reassuring to know that the ink formulators take the time to really listen to the requirements and needs of the printmaker. Caligo inks are carefully made and thoroughly tested" (Caligo Inks, n. d.).

7.6. Oil Based Ink

The formulation of most inks is trade secret and it generally varies according to the print technique being used but in general an oil based ink made for printmakers will contain pigments, or a single pigment, linseed oil and possibly only one percent wax, to prevent scuffing and one percent manganese driers. This type of ink requires solvents for cleaning so should not be used by *gyotaku* practitioners who intend to prepare and eat the specimen at the end of a printing session.

The most common pigment for commercial print applications is carbon black. This is produced by the incomplete combustion of heavy petroleum products such as coal tar and from natural gas. For printmakers inks it is usual to add Lamp Black which has the highest opacity of all pigments and is often described by ink makers as 'fluffy'. Vine Black sometimes called Frankfort Black can be added but single pigment inks are preferred. There are three main reasons for using a printmakers ink rather than an ink manufactured for commercial printing:

1) it will be easy to use as it has been developed for a specific purpose for example, relief printing;

2) it will have greater light fastness as artists prints are created for a long life-span; and

3) because printmakers inks are made from only a few ingredients, the conservation quality, if printed on acid free papers is extremely high.

Because each oil based ink is made for different processes and therefore will contain different components the following is a generic description of the manufacture process of specialist inks for printmakers. The latter process is unlike that of commercial ink manufacturers such as Sun Chemical that for any given production lot produce ink by the multiples of tons[49].

There are three main processes for production of specialist inks, mixing, milling and colour matching. Firstly pigments are tested once they have been purchased to establish the quality with regard to previous batches. Then pigments are weighed and mixed with a vehicle for example, linseed oil. This is made from the seeds of the flax plant, *Linium usitatissimum*. Present day linseed oils are no longer produced by burning due to health and safety legislation. Oils are processed in a closed kettle which produces a heat polymerised oil of predictable and consistent qualities that is known as copperplate or stand oil. It is the vehicle, sometimes called the varnish, which enable the

49 Sun Chemicals is a member of the DIC Corporation and is the world's largest producer of printing inks and pigments.

ink to flow (viscosity) and the more viscous an ink is the greater its resistance to flow. In Europe this is measured in units called poise (dyne.s/cm^2). The force of one dyne is that necessary to move 1 square cm at one cm per second and corresponds to a viscosity of 1 poise. However, the American system uses lithographic varnish numbers from 00000 for very thin and watery to 10 for very thick and viscous varnishes similar to toffee. For relief printing inks a combination of 200 poise and 30/40 poise is used. Each pigment has its own qualities and varies in oil absorption, particle size, colour strength, structure and opacity. Therefore, each ink formula is designed to take account of the type of ink being manufactured and its intended end use, plus the particular qualities of a chosen pigment. The pigment, vehicle and any other ingredients are place in a high speed-dispersion mixer. Every primary particle of pigment is covered evenly in linseed oil. All dry pigment needs to be thoroughly mixed so that there is no air left. Mechanical mixing and agitation helps to break up the larger particles of pigment, which can cluster together creating agglomerates. The next process is milling which further helps to mix the ingredients together and eliminates agglomerates and air and also grinds the pigments to a specified micron by controlling the speed of the rollers. The ink mixture passes over rollers which simultaneously stretch and compress the ink. This helps to obtain the maximum colour strength. The last step is colour matching this is a crucial element of ink manufacture and helps to ensure consistency of a product.

7.7. A Brief History of Ink

The history of ink is closely related to the historical use of pigments, paints and dyes around the world. Ancient inks were formulated for the purpose of writing, drawing, painting, tattooing, and printing. A Korean Buddhist sutra, known as the Spotless Pure Light Dharani Sutra is the oldest known example extant of printing. The ink used on the sutra is thought to be a water based substance similar to Chinese calligraphy and painting ink. Although the exact date of publication is not known it is thought to have been placed inside the pagoda of Bulguksa Temple (also known as

the Seokgatap Pagoda) in 751 CE the year that the pagoda was erected. It has been suggested that the knowledge of printing, and certainly of paper making, came to Korea from China, a country which has a recorded history of over 3500 years. One of the earliest descriptions of making Chinese ink is included in the Chroming *Yao-shu* an encyclopedic work of the fifth or sixth century CE:

> "Since the 1950s, archaeology has also yielded several artefacts of Chinese ink. The oldest is a small piece of ink found in a group of twelve Chhin graves dating back to the -3rd century, in the late Warring States or Chhin dynastic period, excavated at Shui-hu-ti, Yün-meng hsien, Hupei in late 1975 and early 1976" (Needham & Tsuen-Hsuin, 1985, p.238).

Figure 119 - The 'four treasures' including a roll of Chinese paper, an ink stone, Chinese and Japanese black ink sticks, and a selection of brushes. Top right: stone signature seals, a hand carved seal from an eraser, and two different types of red seal ink can be seen. Photo by the author.

The 'four treasures of study', *wén fáng sì bǎo* is an expression used to refer to the ink brush, the ink stick, paper, and the ink stone (Figure 119). Ancient Chinese inks were not only part of the 'four treasures' but were also used for making rubbings from characters cut in stone, wood, jade, oracle bones and three dimensional metal vessels. The process of transfer when a rubbing is taken represents an intermediate stage which taken to its logical conclusion leads to printing (Starr, 2008).

The basic ink composition of black soot and some form of glue mixed with water changed little over the centuries. As the inks, papers, brushes and tanpos were all in existence in China it is a feasible theory that *gyotaku* could have originated in China, the techniques being closely associated with Chinese rubbing. However, there is no evidence to support this theory.

In a similar manner to the Chinese the Ancient Egyptians produced and used coloured pigments and dyes, which became an integral part of their culture. A selection of coloured linens were excavated from Tutankhamun's tomb and on further examination it was revealed that the dyes were made from botanical sources including; safflower (*Carathamus tinctorius*) for shades of red, madder (*Rubia tinctorum*) for yellow and red dyes, and acacia pods formed a blue dye. However, the Ancient Egyptians also made and used carbon black pigment. The carbon was obtained from scraping the outer surface of cooking pots, the black residue was then mixed with water and gum arabic to produce an ink suitable for writing on papyrus. "Pens made from the rush *Juncus arabicus* were chewed by the scribe to separate the fibres into a small brush; while pens of reed (*Pharagmites australis*) used during the Graeco-Roman period were cut with a penknife to form a point and a split was made to allow the ink to flow" (Hepper, 1990, p.30).

Black printing ink was developed from ancient writing inks and the pre-printing techniques such as seals for stamping on clays, and later on paper and silk, stencil techniques for decorating textiles and paper and ink rubbings:

> "All these processes gradually led to more efficient methods of of the mechanical multiplication of copies and, as archaeological and literary evidence indicates, by the +7th century or around +700, printing began in China. Moveable type was introduced by the middle of the 11th century and multi-colour printing some time in or before the 12th century. The moveable type was first made of earthenware, but later various other materials, including wood, metal, and a variety of ceramics, were also adopted repeatedly and intermittently in the following centuries" (Needham & Tsuen-Hsuin, 1985, p.2).

The main problems with Chinese moveable type was the sheer amount of Chinese characters needed to produce even a simple text and the liquid consistency of the black calligraphy ink which

needed to be adapted in order to wet the type characters made of metal or ceramic. Perhaps these problems are the reason that the Chinese did not continue to develop moveable type, which became identified with the letter press process, as a viable process for printing written works. Today moveable type printing "is still maintained in Rui'an County in Zhejiang Province, where it is used in compiling and printing clan genealogies" (Xinhau/Xu Yu, 2010). The UNESCO Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage announced in November, 2010 that wooden moveable type printing as practised in China was inscribed on the List of Intangible Cultural Heritage in Need of Urgent Safeguarding.

Printing reached Europe in the form of woodblock prints from the Far East and by the early 1300's this was a common method used for printing textiles. It was not until the 1400's that woodcuts were printed on paper. Previously, books and religious tracts had been handwritten on vellum or parchment but the quality and availability of paper had increased to such an extent that it was rapidly replacing parchment for most purposes. Woodcut prints enabled one page to be carved from a block of wood and printed with water soluble inks. However, the blocks were cumbersome and led to the search for the first European moveable type. In China Pi Sheng or Bi Sheng (990 - 1051 CE) had moulded separate characters from a clay composite similar to Chinese porcelain, in order to print moveable type four hundred years before Johann Gutenberg is credited with the invention of moveable type in the 1450's in Mainz, Germany (Brokaw & Chow, 2005). However, an alternative theory exists that an Italian engraver Pamfilo Castaldi (1398 -1490) was responsible for the invention of moveable and reusable type in Europe, before Gutenberg (Ambrose & Harris, 2010). Castaldi was said to have used wooden moveable type after having seen books brought by Marco Polo from China. In 1426 he printed several broadsheets in Venice which are said to be preserved among archives at Feltre, a town Northwest of Venice, where Castaldi is thought to have

been born. In 1868 a statue was erected in Lombardy honouring him as the person who introduced typography to Europe.

Despite various theories relating to typography and the invention of printing in Europe it is evident that water-based prints were suitable for wood blocks or wooden moveable type but gave a very poor quality print if metal or earthenware was used as the print matrix:

> "Gutenberg found that the water-based ink was completely unsuitable for use on the new metallic type. Not only had there been difficulty in completely wetting the type with ink, but the very fluid nature of the water mixture resulted in poor reproduction of the characters because the ink did not remain on the surface of the metal and print sharpness was lost. A new ink had to be devised because water could no longer form the basis of the ink, and it was the printer who had to help solve the problem" (Leach & Pierce, 1994, p.2).

At the same time that Gutenberg was developing his printing process, painters who had previously used egg tempera were beginning to use oil paints. The Romans made paints from linseed oil with litharge added as a drier and this method was lost until it re-appeared in 15th century Europe. Although the precise composition of Gutenberg s inks are unknown information exists about the materials in use at that time by painters which includes, linseed oil, walnut oil, turpentine, rosin, pitch, Venice turps, lampblack and vermilion. It is thought that Gutenberg used the same ingredients. During the 16th century printers refined the process of boiling oil to create thick or thin oils as required, which they used in their ink formulations. By the 17th century water-based inks had become obsolete in Europe although they were the main ink used in China, Korea and Japan. In Europe the ink formulations changed little over the next three hundred years. The demand for printed items grew and printers began to find the task of making their own inks time consuming and by 1700's the demand was such that independent oil based ink manufacturers appeared (Griffiths, 1980). The specialist ink manufacturers had more time than the printers to develop a wide range of coloured inks from pigments used by artists. Letterpress printing (relief printing) was the only method of commercial printing for text until the early part of the 19th century, although, engraving was used for pictorial works from the 17th century onwards.

In 1798, Alois Senefelder discovered and developed lithography as he sought an inexpensive way to publish his written works and musical scores. It is said that he purchased some blocks of limestone from the local quarries in Solnhofen, Bavaria, for engraving but when writing his mother's laundry list on one of the blocks using an ink composed of lampblack wax and soap became curious about the possibility of the mixture to act as an acid resist as in intaglio printing. He etched the limestone in dilute nitric acid. While there was no visible change in the level of the stone he later discovered that if the stone was kept damp with water the written areas could be inked with greasy ink and the non-written areas would continue to repel it (Croft, 2001). Senefelder published his treatsie *Vollständiges Lehrbuch der Steindrückery* in 1818 and described his discovery as 'chemical printing'. Due to the Napoleonic wars and the general political climate in Europe lithography was established somewhat erratically throughout Europe.

However, once lithography presses were established stone lithography was used for commercial and artists prints. Large poster hoardings were printed using stone lithography, in some countries in Europe until the 1930's. By the end of the 19th century offset litho, which transferred less ink onto the paper, had been invented. It was necessary to formulate an ink specifically for this process, which had greater colour strength. Fortunately, the new coal tar chemical industries were creating new synthetic pigments with a finer texture and greater colour strength. In 1856 William Henry Perkins serendipitously discovered the first synthetic organic chemical dye when trying to synthesise quinine for the treatment of malaria (Garfield, 2000). By the end of the 19th century two other printing processes were invented, photogravure and aniline. Both needed quick drying inks based on volatile solvents. The aniline process made use of new water and alcohol soluble aniline dyestuffs. Essentially, it was an adaptation of the relief letterpress process and is now known as the flexographic process. Photogravure an intaglio process initially used for the continuous tone reproductions or illustrations and the source of fine art prints for many years used inks containing

varnish that were made by dissolving rosin derivatives in toluene and xylene. The composition of letterpress and lithography inks changed little until the 1920's and the introduction of the first synthetic resins of phenol-formaldehyde polymers (Leach & Pierce, 1994). A great deal of research in the chemistry and physics of polymers and colloidal systems was initiated in industry and universities. Printing ink companies set up in-house laboratories and employed chemists and physicists. Close collaboration between printing ink industries and universities resulted in a greater understanding of the behaviour of inks and laid the foundations for the rapid expansion in ink technology brought about by the petrochemical industry in the 1940's. During this time many new pigments, polymers, solvents and additives were produced. From the 1950's onwards ink technology was further transformed by the birth of the packaging industry and the new technology used in printing magazines. By this time the variety and range of printing processes all had their own inks which over the years were upgraded and developed, to accommodate health and safety legislation in the workplace and steps were taken to reduce pollution and more research was carried out on the long-term health effects of working with particular chemicals. Artists as well as the industrial printing workers became more aware of the side effects associated with printing processes and the materials which they were using:

> "It is ironic, however, that in the 1990's much R&D effort is being spent on water-based inks, which is how the ink maker started some 1000 years ago; although, now of course, for 20th century environmental reasons" (Leach & Pierce, 1994, p.5).

Many contemporary *gyotaku* practitioners use water-based inks for environmental reasons because they do not require solvents for cleaning, and for culinary purposes as they can easily be washed off an edible specimen which can be cooked and eaten at the end of a printing session. In Japan both water-based and oil based inks are available which are specifically designed for *gyotaku*. Although ink, paper and a brush or tampo/dabber are the basic materials and tools necessary for producing *gyotaku* other approaches that depend on a different kind of ink or a chemical reaction

from contact with chemically coated papers have been produced. One such example is a fish printing kit made in Japan called *Gyotax*.

7.8. Gyotax

Specifically designed for fisherman the kit contains several sheets of black carbon paper and several sheets of soft Japanese paper. Before printing the fish must be thoroughly cleaned and dry. A sheet of the black carbon paper is laid over the fish and rubbed to transfer black carbon to the surface of the fish. The carbon paper is removed and a small circle of paper is cut out and placed on top of the fish eye to act as a mask. A print is made by placing a sheet of the plain Japanese paper on top of the fish and rubbed to transfer the carbon on the fish onto the paper. With the 'Gyotax' (Figure 120) kit it is possible to achieve crisp and detailed, direct *gyotaku* images in black.

Figure 120 - Instructions from the Gyotax kit. Image courtesy of Professor Emeritus Eric Hochberg

7.9. Fushimi Co. Ltd Inkless Paper

The Fushimi Co. Ltd., based in Sanda City, Hyogo, Japan reported in the publication 'New Technology Japan' in 2000 (Anonymous, p.18) that they had developed an:

> "…exclusive paper, which does not require the use of *sumi* ink, to take fish prints. Catch and release has been a custom for recreational fishing since ancient times in Japan. Japanese fishermen have a tradition of *gyotaku* (fish prints) to record the caught fish length, which are made by painting sumi ink on the fish body, then making a print on washi paper"

The article describes the direct technique and argues that the problem with fish printing is that the fish first needs to be cleaned by rubbing its body with salt to remove all traces of mucous and this will probably kill it. *Gyotaku* are normally made from fish which have already been killed,

so statements related to killing the fish are irrelevant. Nonetheless, it is true that to create good *gyotaku* prints it is essential to remove all traces of mucous. The paper produced by Fushimi Co. Ltd is apparently coated or impregnated with a special colourless chemical which turns purple when it comes into contact with the proteins present in the mucous that covers the body of the fish. Although the printing kit claims that it is not necessary to clean the fish body with salt it is necessary to dry the fish by wrapping it in a towel and placing tissue under the gill and in the mouth. Once the paper has been placed over the entire body, fins and tail of the fish to generate the *gyotaku* the animal can be released into the sea or river. Approximately three hours after the special paper has been rubbed onto the fish an image will appear. It is then necessary to make a monochrome copy using a copy machine. Supposedly, the prints created in this way do not have any “painting unevenness.” However, unless this process can be performed immediately once the fish has been caught and the hook removed, without wrapping it in a towel or pushing tissue under its gill cover and in its mouth I believe that printing it in this manner would cause stress and unnecessary pain. Therefore, I would only recommend using a fresh but very dead fish. The paper is not given a name but the tiny illustration which accompanied this article has the word 'Tackler' in the bottom left hand corner. Perhaps this is the name for this process or paper?

7.10. USA Patent for Fish Printing Techniques for 'Catch and Release'

An 'invention' which sounds similar to the Fushimi Co. Ltd system was filed for a United States of America patent on May 17, 1979 and is currently listed as United State Patent 4,245,002, Morimi et al. January 13, 1981. The inventors Yokichi Morimi of Ibaraki City, Osaka prefecture and Masamichi Kuroda of Takarazuka, Japan describe a technique for producing fish prints as follows: “A method of making fish prints by using paper or silk cloth to which special chemicals which show colour reaction to the secretion or humor at the surface of a fish body was previously applied, and paper or silk cloth to be used exclusively for such fish prints” (USPTO, 1979).

In the information provided in the patent it explains that, due to the recent rapid increase in the numbers of anglers who wish to record their catch for fishing contests or other purposes, a method for coating paper or silk has been invented which enables the fishermen to 'catch and release' the fish without harming it. The substrates are coated with a combination of chemicals which the inventors claim are “almost colourless and non-poisonous and also free from pollution” (USPTO, 1979).

The colour reactions are listed as Aberhalden's reaction, burette reaction, xanthoprotein reaction, Millon's reaction, Sakaguchi's reaction, Pauly's reaction, Folin's reaction, Adamkiewicz reaction, Libermann reaction, Neubauer-Rhode's reaction and so on. These are chemical indicator dyes used to monitor specific reactions and are useful in analysing the natural compounds / molecules which are present in fish mucous e.g. Folin's reaction detects amino acids and Pauly's reaction is used for imidazole. Some of the chemicals used are the combination of (1) caustic soda and copper sulphate, (2) nitric acid (3) mercury and fuming nitric acid or (4) 1.0% ninhydrine solution (Gomori, 1952). These chemicals are potentially hazardous but are present in such small quantities that contact with the mucus on a fish means that the actual skin is unlikely to be exposed to major concentrations that would be noxious. However, any handling, manipulation and keeping out of water is extremely stressful for fish if they are not anaesthetised. Therefore, I would not recommend this catch and release system for *gyotaku* practitioners.

8. Tools and Techniques

8.1. Introduction

One of most important tools for the *gyotaku* practitioner is the brush which is used in all three *gyotaku* techniques for painting in the fishes' eyes. Generally brushes are used for applying ink in a single colour or several colours directly onto the body of a specimen when using the direct *gyotaku* technique. Perhaps the most useful brush for this task, whether made in China, Japan or the West is a brush with a flat head. Sometimes brushes are used to add colour or details such as markings to an image once it has been printed using the direct technique. *Gyotaku* practitioners hold different opinions regarding how much 'enhancing' of an image should be performed. Mineo Yamamoto does not recommend painting onto a fish image as it becomes more of a painting than a print although other artists often use this technique (Yamamoto, 2012). Jeanette Jobson's front cover and inside pages of the Conservation magazine (Halverson, 2012) is a perfect example of this (Figure 121). A rainbow trout has been printed using the direct *gyotaku* method and gestural marks in bright watercolour paints have been applied using a brush and splattering techniques.

Figure 121 - 'Camouflaged Rainbow', by Jeanette Jobson used for the cover and inside pages of the Conservation magazine. A direct *gyotaku* of a rainbow trout with additional watercolour. Image courtesy of Jeanette Jobson © 2012.

Another style of direct *gyotaku* which is sometimes referred to as the 'Hawaiian technique' involves printing the fish after coating with black ink and once the impression has dried painting in the colours and any distinguishing marks. This technique is more similar to the direct prints in a single colour (black) made by fisherman to record their catch. An example of a *gyotaku* artist who uses this technique is Naoki Hayashi based in Kaneohe, Hawaii. Hayashi paints his fish specimens with a thin layer of non-toxic black ink or non-toxic black acrylic paint using large flat head brushes (Figure 122). The brush marks are highly visible at this stage which would not create an aesthetically pleasing print. In order to pick up the detail of the fish and eliminate the brush marks he dabs off the majority of the ink, by using an old T-shirt or towel ensuring that the remainder of the ink lies in a thin even layer. Hayashi's preferred paper is *Shoji* paper, the same acid free paper used in the construction of traditional *Shoji* screens for Japanese interiors (Personal communication, September 20, 2011). A sheet of *Shoji* paper is placed on top of the specimen and Hayashi gently rubs this with his hands. It is often easier to use the whole hand rather than just the fingertips when

printing larger specimens. The resulting *gyotaku* print is either a pale grey image or a darker shade depending on the natural appearance of the chosen specimen. Each *gyotaku* contains a lot of detail and when the print is dry a paintbrush is used to enhance the colour and any markings on the fish and the eye is painted in:

> "This, Hayashi says, holding up the paper, is what is almost impossible with a brush and paint. This is the art of fish rubbing, also known as *gyotaku*" (O'Connor, 2013, n. p.).

An artist's "chop" mark is applied in red ink and then the print is signed. As a spear fisherman, Naoki Hayashi has plenty of opportunity to view the ocean life in its natural habitat and tries to capture the realistic colours of the fishes that he sees through his mask when diving. Hayashi states:

> "I grew up in the ocean, so I start thinking like fish. When I try to print them in a way to show how they chase bait, I am so used to seeing it, so I don't need to look at any reference. I close my eyes and imagine. I try to feel how it is to be in the water swimming with them." (O'Connor, 2013 n. p.).

Hayashi cleans, cooks, and eats the fish, octopus, and squid at the end of a printing session and likes to share this with family and friends.

Figure 122 - Naoki Hayashi in his studio applying ink with a flat head brush. Photo by Nathalie Walker, courtesy of MidWeek Printing Inc., © 2013.

8.2. Brush Sizes and Names

Modern artist's brushes come in various sizes depending on where they were manufactured and in the West they are numbered from the smallest, 0000 to the largest, 30. However, there is no exact standard for brush dimensions and these may vary slightly depending upon the manufacturer. The Chinese and Japanese tradition of brush making pre-dates that of the West, with each having their own system of naming and sizing brushes. Furthermore, the appearance, manufacture process, bristles, characteristics and generally the use of Far Eastern brushes are quite different to that of the Western artists brushes, there is no clear-cut distinction between painting and writing brushes. Some examples of Chinese brushes are those used for writing large calligraphy characters called *Ta-Kai Pi*, smaller ones for writing letters and documents and a perfect size for painting *gyotaku* fish eyes is called *Hsiao-Kai Pi* and the brush called *Kung Pi* is one of the smallest (Xi, 2012). Japanese brushes called *fude* were measured using units called *bu*, the same unit used to measure tools such as chisels and saws. *Bu* comes from the traditional Japanese measuring system called *shakkan-hō* which originates from the unit of length *shaku* and *kan* the unit measurement of mass. From 1924 the *shakkan-hō* was replaced by the metric system. One *bu* is equal to3.030 millimeters (Conant, Rimer & Owyoung, 1996). Brushes also have their own particular Japanese names that often refers to their use such as *Tsukemawashi*, which is used as a paste brush for joining together *washi* paper and is frequently used by paper conservators. Another paste brush which can also be used for painting is called *Noribake* (Figure 123). An useful Japanese brush for *gyotaku* printers is called a *Hake*, which consists of either a wooden or bamboo handle with a large flat head made from soft white goat or sheep hairs.

Figure 123 - *Noribake* Japanese brushes for pasting or painting, made in the traditional way with cherry wood and white sheep hair. Image courtesy of The Japanese Paper Place © 2011.

The brushes used in Chinese and Japanese rubbings are different from painting or writing brushes and is sometimes called a tamping brush as it is used for tamping the paper onto the stone. They can be made from very stiff bristles or palm fibres, and have a flat head rather than a round or pointed tip. The action of applying ink with these brushes is a dabbing action not the typical sweeping action in painting or writing (Starr, 2008). The same applies to woodblock printing brushes. Water based ink is rubbed onto the surface of the woodblock to give a key print, which all subsequent colours /blocks are registered to.

8.3. A Brief History of the Brush

The invention of the brush is thought to have come from China. The oldest Chinese brush extant comes from the Warring States period (around 480-221 BCE) and was discovered in 1954 at the *Chu* Tomb near *Ch'ang Sha*, the capital city of Hunan in South-central China:

> "Its length 21cm, the brush case 23cm. Both the brush handle and the case were made of bamboo; the brush head was made of rabbit hair, a soft fur" (Da-Wei, 1990, p.7).

The brush is designed so that the head is not fixed and can be changed. Dard Hunter, in an earlier publication (1978) reports the commonly held theory regarding the invention of the brush:

> "Then in 250 BC, the Chinese savant Mêng T'ien invented the camel's hair brush. An innovation that not only revolutionised the writing of Chinese characters, but was instrumental in the further development of woven cloth as a writing material, a substance which, along with the papyrus of Egypt and the parchment of Asia Minor, made possible the manuscript scroll, the first form of book in its true sense" (Hunter, 1978, p.4).

In this passage it is important to note Hunter's use of "camel hair brush", these brushes are not made from camel's hairs but may contain Asian pony, goat or squirrel hair, which is similar to the situation with the brushes known as wolf hair which actually contain weasel hair. A wide range of materials have been employed in making Chinese brushes and contemporary materials are bamboo for the stalk or handle, although special brushes are made of horn, carved bone, Sandalwood, Jade or other precious materials. The bristles of contemporary Chinese brushes come from pig, buffalo, rabbit, badger, goat and sheep. Brushes are also made from chicken feathers and fluffy chicken down. Brush making in Huzhou in Zhejiang province dates back to the Qin Dynasty and today it is known as the home of the ink brush and holds an annual ink brush festival. A well-known brush is the *Xuan* (the same name is given to a type of Chinese paper) that is made from brown rabbit fur and has been popular since the Tang Dynasty (618-907) (Nan, et al., 1997).

The oldest examples of brushes in Japan are to be found in Nara at the Shōsōin, which houses Emperor Shomu's treasures from the eighth century. The brushes come from China and are made from goat, rabbit, raccoon and other animal furs. They range in length from 30 to 65 cm. In the early ninth century Kukai, the priest who founded the Shingon sect returned from China and ordered brushes to be made in Japan following Chinese methods. The early craft of brush making was controlled by the Imperial court but by the Heian period people outside the court needed brushes and the craft passed on to independent makers. During the Edo period with the Tokugawa governments adoption of Confucian principals the Chinese style became fashionable and the 'roll brush' was replaced by the Chinese 'water brush' made from horse hair or deer hair. The roll brush

had hairs around a solid core which meant that only the very tip could be used. The water brush is made entirely of hair and the whole head not only hold the ink but can be used in writing or painting. It allows for a greater variety of strokes and subtlety in shading, which is essential in painting. After the Edo period (1615- 1868 CE) there were no further changes in brush design. Contemporary brushes may be mounted in plastic and there are a number of machines for mass producing a range of Japanese style brushes. However, brush making by hand remains one of the traditional crafts (Lowe, 1983). Handmade brushes may have horn, painted porcelain, jade or precious metals as their handles and like the highly decorative and commemorative ink stick have become collectable object d'art. The name of the shop and if it is a brush of particularly fine quality will include the seal of the craftsman on the handle.

Until the later part of the 1600's European artists made their own brushes. These early paintbrushes were made from quills of soft hair or bristles and a description of how to make a brush was given by Cennini in his book *Il Libro dell'Arte*. (Cennin & Thompson, 1954). This type of brush was used in Europe for several centuries despite the fact that as with ink manufacture, craftsmen began to manufacture brushes for artists allowing them more time to paint. The head of the brushes were round in shape and it was not until the industrial age that metal ferrules were introduced and brushes could be produced in filbert and flat shapes. Brush making in Europe in common, with the Far East was considered an important and highly skilled craft and today the titles of Brush Master and Brush Apprentice are still used in the brush manufacturing industry. Developments in the textile industry led to the manufacture of synthetic bristles which may also be used in hand-made brushes. The synthetic bristles mimic the multi-diameter found in natural bristles and the most commonly used are a special multi-diameter extruded nylon filament and Taklon, a multi-diameter polyester. Modern synthetic brushes are ideal for *gyotaku* and good quality brushes do not shed hairs and enable ink to be applied to the body of the fish evenly. 'Foam brushes' which

consist of wedge shaped pieces of foam attached to a plain wooden handle are a cross between a brush and a dabber and some *gyotaku* artists like to use them as they are inexpensive and can be washed and re-used.

8.4. Dabber's, Dauber's or Tampo's

The second most important tool is the dabber sometimes called a dauber or a tampo. These are frequently made by the *gyotaku* practitioner although they can be purchased from companies that supply Japanese rubbing inks and paper. Tampo's are used in the indirect technique for gently dabbing ink (Figure 124) onto the paper or fabric and result in a final image that may be made from several layers of ink. A tampo is required for each colour used in the print. A perfect example of the step by step stages of building up layers in the indirect *gyotaku* technique made by Boshu Nagase of a small European sea bass (*Dicentrarchus labrax*), was exhibited in 2012 at the Concarneau Fishing Museum in Concarneau France. The five separate prints reveal the process the first is in blue, the second is blue and yellow, the third in blue, yellow and brown, the fourth print in a slightly pinkish hue was added with a very pale baby blue, and in the fifth and final print the eye had been painted in and some areas had a bluish-black colour added to them to give a greater contrast. Tampo's are sometimes used in the direct technique, to apply oil based ink and to blend the colours together once they have been applied directly onto the fish. The tampo is also used to eliminate any brush marks when using water based mediums or inks. Heather Fortner demonstrates this in her DVD (Fortner, 2008).

Figure 124 - Figure – 124 Mineo Yamamoto demonstrating the use of a tampo, 2010. Photo by the author.

Mineo Yamamoto has explained concisely the process of making tampos:

> "Making Tampos
>
> Several tampos are required for making a coloured fish print-- one for each colour you will be using. The size of the tampo varies according to the size of the fish. Take a suitable amount of cotton and make it into a ball by pushing or folding the cotton toward the center little by little. Cover the ball of cotton with silk and straighten the excess part of the cloth that does not cover the ball. From the base of the ball wind a rubber band up around the excess cloth to straighten and make it firm. This will be used as the handle. When finished, each tampo should be as soft and springy as your ear lobe" (Larsen, 2011, p.61).

Another method of making a tampo replaces the traditional cotton ball or silk wrapper with a cosmetic sponge that is placed on top of a wine cork and held in place with a pin. The cosmetic sponge is eased down over the cork with three small bits of masking tape and forms a round shape that is secured by wrapping more masking tape around the wine cork to form a handle and then the

pin is removed. The cosmetic sponge is not flawed by the pin as it expands leaving no mark. This method can also be used to make larger tampos using empty plastic bottles as the handles.

Heather Fortner has developed a method using firm upholstery foam which she cuts into a rectangular block using an electric carving knife. She then secures an elastic band in the middle and then another band just above this, gently easing the edges of the foam over she binds it with masking tape creating a large tampo with a handle. These handmade dabber's resemble those used for Chinese Rubbing's although the materials may vary.

8.5. *Gyotaku* Techniques

There are three basic *gyotaku* techniques. Over the years, various artists have adapted the techniques for their own purposes and to accommodate the use of different materials. Therefore, I will explain the traditional methods for each technique and list some of the adaptations which have been adopted. For each technique and any variations of the techniques it is essential that the fish (or other specimen) is thoroughly clean and dry before printing. This ensures there is no blood, viscera, mucous, or other bodily fluids, on the surface which would impair printing. In the direct method any mucous left on the surface make brush marks highly visible when using water based inks. When using oil based inks it is difficult to apply the ink as the mucous repels the ink. Although, the application of the ink is not so problematic in the indirect technique mucous may affect any glue which is used to secure the paper or cloth to the specimen's body. If mucous comes into contact with the paper or any bodily fluids leak onto the paper it becomes stained, non-archival and prone to attack from insects. It is possible to remove small stains with a diluted solution of hydrogen peroxide. However, this is not good for the paper and should ideally be avoided. The fisherman whose *gyotaku* I have investigated always take the time to thoroughly prepare their fish and ensure it is perfectly clean before taking an impression. This is regardless of the conditions and location of

printing. Although, there have been rumours or suggestions about catch and release *gyotaku* I have found no proof of this and believe the fish would probably not survive due to stress. The preparation of a fish for any *gyotaku* technique generally takes more time than the printing stage.

8.5.1. Cleaning the Fish

Fish for printing are washed in cold water paying particular attention to the mouth, gills and pectoral fin which lies against the body and can trap mucous. Particular attention must be given therefore to cleaning the fins and tail, which are opened and water gently run over them. Some Japanese printers recommend dissecting the fish by cutting it almost in half through the length of the body. The vertebrae or backbone is kept intact on the half that is to be printed. However, this is not necessary and unless you have an extremely sharp knife it is an irksome task. Many *gyotaku* practitioner keep their fish whole and print it either from the side, from above (dorsal), or the underside (ventral) depending on the form of the fish. Once the fish has been washed in cold water the mucous needs to be removed and this can be achieved using fine grain salt, vinegar, and lemon juice. Today some practitioners prefer to use washing up liquid or alcohol, which not only removes the mucous and any bacteria which may be present but also helps to dry the fish. The choice of products is a matter of preference and availability. The salt or other product is applied liberally to the surface of the fish and left for about one minute and then gently rubbed in with the fingertips, taking care to avoid losing the scales. If a fish is particularly damaged it is possible at this stage to remove all the scales and an impression can easily be made by printing the scale pockets. Rinse again in cold water to remove all traces of the salt (or other products) and mucous and dry gently using a towel or disposable paper towels. It is easy to see if any parts of the specimen are still leaking by pressing a paper towel onto the fish as if one were printing it. If the fish continues to leak it may be necessary to gut the fish and seepage is sometimes controlled by inserting pads of cotton wool or paper towels under the gill flap and the nares (nostrils) and vent (anus). Some

contemporary practitioners use super-glue to close all of the orifices but this is not recommended if you wish to eat the fish later.

8.5.2. Making a Support for the Fish

Once the fish is dry the roundness of the body and the best position for printing needs to be assessed. Flat fish such as skate, rays, flounders, soles, halibut, etc. can easily be printed from both the top side and the underside. Fish such as monk fish are usually printed from above (the top side). Fish such as horse mackerel, salmon, etc. are printed from the side and the fish needs to lay in a flat position for printing and a platform, or printers jig, is made to support the fish and thus ease the inking and printing process. Each *gyotaku* practitioner has their own preference and some like to make a support out of a fabric bag filled with sand (Figure 125), or if on a sandy seashore or river bank a fish can be laid on a waterproof cloth and gently pushed into the sand making a natural mould to support it. Others use a table covered in newsprint and support the tail, fins and head as necessary using modelling clay, plasticine or thin strips of wood called *atieta* in Japanese (Hiyama, 1964). A modern adaptation is to lay the fish on insulation foam, trace the shape of the body and cut this out with a craft knife, lay the fish in the form and position the fins and tail with pins (Figure 126). Sometimes a fin is cut off and printed later and if this is done an accurate measurement of its original position is required in order to place the fin in the correct position. At this stage some practitioners prefer to remove the eye from the eye cavity and plug this with cotton wool or paper tissue. Other practitioners leave the eye in situ and cover it at the printing stage with a piece of paper.

Figure 125 - Stephen DiCerbo supporting a China rockfish (*S. nebulosus*) by using a sand filled cotton bag. Photo by the author.

Figure 126 - A China rockfish (*S. nebulosus*) supported using insulation board. Photo by the author.

8.5.3. Preparation for Printing

Workstations and printers hands need to be kept clean and the space organised in order to create good quality prints. 'Baby wipes' are often used for cleaning hands and any stray spots of ink on the support or the palette knives used for mixing the inks. Palettes for mixing oil based inks can be either the disposable tear off sheets used for oil painting or a palette or ink slab wrapped in freezer paper with the shiny side uppermost. These can be disposed of at the end of a printing session. Once the fish is thoroughly cleaned, dried and supported the next step depends on which technique is chosen.

For **Direct printing, *Chokusetsu-ho,*** the inks are mixed and then small slips of paper are placed around the fish slightly under it, without lifting it from its support. The ink is applied in a thin even layer with brushes and/or dabber's. A circle of paper is placed over the eye socket so it does not print and easily stays in place during printing as it sticks to the ink. If using a brush the ink should be applied in one direction (e.g. head to tail) and not by brushing up and down so that the fish's scales sit in a regular overlapped pattern as if the fish were swimming. Another effect can be achieved if the diluted ink is applied from the tail towards the head as the ink sits in the concave part of the scales and the appearance of the print is different to the first method. As previously indicated the fish scale pockets can be printed if the scales have been removed.

For **Indirect printing, *Kansetsu-ho*** damp paper is gently pressed over the entire surface of the fish using a clean sponge. The paper is moulded to the shape of the fish and allowed to dry. Alternatively, a very thin and even coating of glue is used and Japanese rice starch glue of archival quality is the best option as it does not affect the paper. Then the paper or cloth (Figure 127) is gently pressed onto the fish with a clean sponge and any wrinkles smoothed out. Nowadays, a hair drier is used to speed up the drying process.

For **Transfer Printing,** ***Tensha-ho*** the fish is covered in oil based ink or paint using a brush and it is important to ensure there are no visible brush marks.

Figure 127 - A fish ready for indirect *gyotaku* printing, supported on an insulation board with a sheet of white synthetic fabric glued to its surface with archival quality paste. Photo by the author.

8.5.3.1. Direct Printing

The ink should be applied in a thin even layer and there should be no visible brush marks. A modern adaptation is the Hawaiian technique in which only a layer of black ink is applied using a synthetic flat head brush and the majority of this dabbed off. Paper is held above the fish and gently placed over it. One hand is used to hold the paper in place and the other hand is used to rub, some use only the finger tips others use the whole hand. There are no rules for the method of paper application it is merely a matter of preference, as is the direction of printing. This can be from head to tail, or vice versa or regardless of the way the fish is facing one hand is dominant over the other and always goes in the same direction. It is important not to press or rub the paper too hard at the

point where the fins join the body as it may cause a tear in the paper. When viewing a *gyotaku* impression the human eye will naturally join the fins to the body. Once the entire fish has been printed carefully remove the paper (Figure 128) and leave to dry.

Figure 128 - Barry Springer lifting a sheet of paper from an inked fish during direct *gyotaku* printing. Photo courtesy of http://www.*gyotaku*artist.com.

8.5.3.2. Indirect Printing

The tampo is dabbed into the ink and then dabbed onto a piece of paper or disposable palette paper to test the amount loaded. A Japanese method is to dab the tampo in ink and then transfer it onto a slightly bigger Awase tampo thus creating a pad like an ink stamp pad (Hiyama, 1964). The ink is then applied not from the palette to the tampo but from the *Awase tampo* onto the ink tampo. This method ensures that only a very thin even coating is applied. Each colour is applied using one tampo per colour. Layers are built up one colour at a time. Depending on the fish and the markings of the fish five or more colours is usual. The natural markings and patterns found on some fish can be reproduced by using paper stencils. To make a stencil the pattern or markings are traced onto a

sheet of transparent paper which is placed on top of the fish. To avoid a harsh and unnatural looking edge it is advisable to use a paper such as light weight tracing paper or Chinese Xuan paper as a design can be burnt into these papers using an incense stick. For many years Mineo Yamamoto used a special paper made in Japan for this purpose (Figure 129). Unfortunately, this paper is no longer produced and remaining stocks are becoming difficult to find. Paper stencils are generally used once the fish has been printed. The stencil is placed on top of the dried print and ink dabbed through the burnt parts of the stencil to create markings. This technique is especially useful for the complex spots and stripe pattern found on a mackerel.

Figure 129 - A reference print of a mackerel and below a paper stencil made by Mineo Yamamoto using an incense stick to burn holes into a special Japanese transparent paper. Photo by the author.

Furthermore paper masks (Figure 130), stencils and slips of paper are used to create a sharp outline and give a definite shape to the fins and tail. Once each colour has been printed the paper is carefully removed. If oil based inks and a glue have been used the paper can be lightly misted with water to help release the paper. This is why it is essential to check the types of inks which are to be used before hand to decide if a glue should be used or not as water may affect the ink.

Figure 130 - Shane Anderson applying red ink with a tampo and using paper masks during indirect *gyotaku*, 2010. Photo by the author.

8.5.3.3. Transfer Printing

A sheet of polythene is placed on top of the inked fish and printed using gentle pressure from the fingertips. The sheet of polythene is then removed and pressed onto another substrate including, leather, wood, textiles, paper or three dimensional objects and the print is left to dry.

8.5.4. Painting in the Eyes

In any fish print the eyes are always painted in once the print is thoroughly dry (Figure 131). *Gyotaku* practitioners often take a photo of the fish eye for their own reference before they start to

print. Reference books can be used but photos of the eyes are often very small and difficult to see. Fishermen have the perfect opportunity to record the vibrant colours and the details of the eyes of freshly caught fish. A variety of mediums can be used for painting in the eye, including printing inks, paints such as watercolour, gouache and acrylic and coloured watercolour pencils. A white highlight in the eye should always be included to add realism.

Figure 131 - Naoki Hayashi painting in the eye. Photo by Nathalie Walker, courtesy of MidWeek Printing Inc., © 2013.

8.5.5. Signing the Print

Gyotaku practitioners sign their prints in the usual manner using a pencil but many combine this with a 'signature seal', known as a 'chop mark' or *hanko*. These are translations of a person's name or a leisure seal which gives a short phrase (Figure 132). They are placed in a position which the artist finds aesthetically pleasing:

> "The idea of asking more money for a signed print as opposed to an unsigned work began with the reproductions controlled by the Printseller's Association in the nineteenth century and was taken into the realm of the original print by Whistler who charged twice as much for a signed lithograph as for an unsigned proof. It still remains perfectly true today that a signed, limited edition of original prints will sell for more than a work which is unsigned or where there is no limit to the number produced" (Turner, 1994, p.104).

The value of signed prints also applies to *gyotaku's* which are normally produced as a single impression called a unique print. 'Variable editions' of *gyotaku* are possible but this is very unusual.

Figure 132 - The personal seal of Kirby Wilson printed in red. Image courtesy of http://www.freshcatch*gyotaku*.com.

8.6. Replica Life Forms

Nasco is an American company that supplies and develops educational materials. Their headquarters is based in Fort Atkinson, Wisconsin, USA. This location is only 34 km from Watertown, where the first kindergarten in the USA was founded by Margarethe Meyer Schurz in 1856. Schurz began her kindergarten as she recognised the importance of early learning and play in child development. The Nasco company endeavour to assemble a broad range of materials to stimulate cognitive development and creativity, not only for early learners but for all ages. Part of the Nasco range is the 'Nasco Life/form® *Gyotaku* Kit' and the Nasco Life/form® Fish Replicas (Figure 133). A wide range of Life/form® fishes are available in marine and freshwater species, including; a starfish, a seahorse and a turtle (Nasco, 2013). These replicas are inexpensive and

particularly useful for educators who may not always be able to procure fresh fishes suitable for *gyotaku* printing. The replicas are also useful tools for the experienced *gyotaku* practitioner.

Figure 133 - A range of Nasco Life/form® silicone replicas for *gyotaku* printing. Image courtesy of http://www.eNasco.com.

8.7. Rubbing Techniques and Seals

As discussed previously in this chapter it is the combination of materials, techniques and tools which facilitate *gyotaku* printing. Although, the exact origins of the direct and indirect techniques are uncertain one theory claims that *gyotaku* probably evolved from the ancient Chinese rubbing techniques. Certainly the Chinese materials such as the inks and papers are suitable for fish printing and many aspects of Chinese ink rubbing techniques are similar to the indirect *gyotaku* technique. This is a plausible theory supported by the historical relationship that China has with Japan and the substantial influence upon its culture. Eric Hochberg, who has studied all forms and methods of nature printing comments that "A direct extension of the ancient Chinese stone rubbing techniques led to the Japanese art form known as *gyotaku* or "fish rubbing" (Hochberg, 1985, p.7). And Roderick Cave who has studied nature printing for decades declares:

> "Taking rubbings from inscriptions in metal, bone, or stone is a very old technique in the Far East – perhaps older than paper making itself, and certainly well-established in China by the sixth century AD. The method demands a soft pliable paper with long fibres, which can be pressed closely into the interstices of the inscription, and then inked, producing a print in which the text appeared white on a black background. On occasion prints can be made from three-dimensional objects such as bronze jars (Tsien, 1985). Such Ink squeezes as they are often called, were almost certainly the inspiration for the Japanese method of taking prints from fish" (Cave, 2010, p.177).

However, a contrasting theory suggests an independent origin of *gyotaku*. Yoshio Hiyama claims:

> "Ancient Japan was much influenced by Chinese culture and hence it was thought that *Gyotaku* may have been introduced into Japan from China. However, all out investigations show that *Gyotaku* was introduced to China only recently and by the Japanese. Though the Chinese have excellent technique and materials for stone monument rubbing, there has been no evidences of any particular development in *Gyotaku"* (Hiyama, 1964, p.8).

8.7.1. What is a Chinese Ink Rubbing?

This technique originated in China possibly as early as the Han or Tang Dynasty. In simple terms rubbings are ink on paper reproductions of incised or cast, bas-relief text and/or images. The paper is always laid on the item to be rubbed and ink applied directly onto the paper, in the same manner as indirect *gyotaku*. Common materials for taking a rubbing are stone and metal. Other materials include oracle bones, animal horn and jade. These materials are decorated with fine inscriptions and therefore the paper required to make such rubbings needs to be strong and yet extremely thin (Yang, 2010).

There are several important terms used to describe the methods for creating Chinese rubbings, these will now be explained to facilitate understanding of the process, materials and tools utilised in the techniques and how these relate to *Gyotaku*. Two types of rubbings exist with two different methods involved in their production. The first known as 'simple' gives a two dimensional result. These are made by rubbing intaglio and relief texts or designs from stone, metal or other hard substances. The surfaces of these are flat or only very slightly curved such as commonly found on a

stela. If the depth of the relief designs on the surfaces or the curvature increases then a 'simple' rubbing may not be a successful method of reproduction. The second type of rubbing known as a 'composite is used for creating images from three dimensional objects such as round or square shaped bronze vessels or libation cups, or on occasion from ceramic vases. These are called *quanxing taben,* full-form rubbings, or *chhüan hsing tha,* whole-shape rubbing and give a two dimensional image of a three dimensional object with an accurate perspective (Starr, 2008). Alternative names are *tuxing ta,* pictorial rubbing and *qixing ta,* vessel form rubbing. Today, Chinese rubbings are often referred to under the generic *taben* or *ta'pen*. The terms 'simple' and 'composite' refer to both the difference in the techniques employed in making a rubbing and the appearance of the finished image.

Two techniques are employed the 'wet' and the 'dry'. The main difference between the two techniques is the way in which the paper is laid, either wet or dry and how it is manipulated, plus the ink, which can be applied moist or solid. The wet technique is widely used and has changed little over centuries. The 'wet' technique can be used to make 'simple' or 'composite' rubbings and is perhaps the most versatile technique. First, the stone or other item is cleaned. Sometimes when moss has grown on a stone monument it can be left in place and becomes part of the overall image. Next, paper is placed on the rubbing item and made wet by using a special tamping brush and a gentle dabbing action, similar to using a dabber or tampo to apply the ink in the indirect *gyotaku* technique. At this stage the moist paper can be manipulated gently and if a large item is to be rubbed another sheet of paper can easily be aligned without the need to overlap. When this is dry moist ink is applied, if the tamping and inking are successful the result is a strong graphic images with sharp definition. In the 'dry 'technique rubbings have a paler colour and the clarity of the image is not so well defined. As the name suggests, 'dry' paper is applied to the item, it is not tamped or manipulated into position and 'dry' ink is used to make the rubbing. Chinese rubbings are often

thought of as black ink on white paper (Figure 134). Even so, for aesthetic reasons red, blue, green and orange inks are used to make decorative rubbings (Ruitenbeek, 2002). Consequently, it is easy to imagine how the 'wet' technique could be applied to printing a fish rather than an inanimate object.

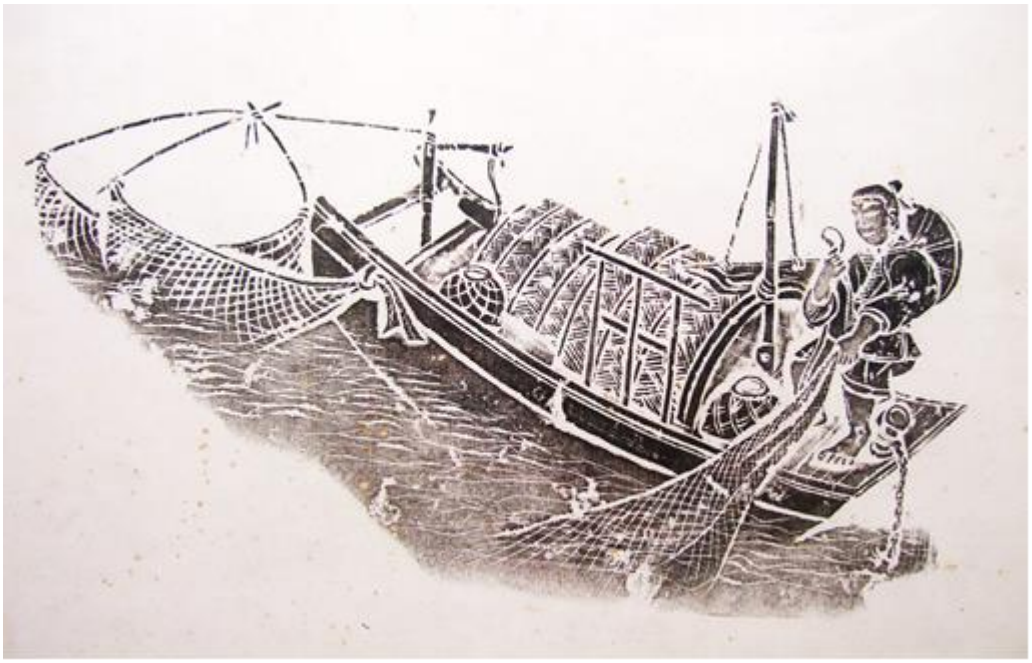

Figure 134 - Rubbing of a bas relief stone carving 'Fishing Boat' carved in the Yuan Dynasty (1271-1368 C.E.), Shaanxi Province, China. Collection of Lily P. Scholes. Photo by the author.

Rubbing's in Japan are still produced today and called *'takuhon'*. Early examples arrived in China from Japan and it is thought that the Japanese began making their own rubbings during the early Muromachi period. During the Edo period rubbing techniques were used to make botanical images and it is probably at this time that colour was introduced. As in China the Japanese rubbings are taken from a variety of stone and metal monuments, and more recently from objects such as coins, the ornamental guard from sword handles, and manhole covers. Researchers make use of the *takuhon* technique for studying text and images on carved stone monuments, ceramics and cast iron bells. Master craftsman, Kasyu Yabuta of the Sogeisha Workshop in Kyoto attended the 2nd

International Printmaking Conference IMPACT in 2001, held in the University of Art and Design, Helsinki, Finland where he introduced an international audience to this popular Japanese art (Personal communication, August 17, 2012). For exhibition purposes rubbings are often mounted onto a backing paper or *kakejiku* (hanging scrolls) and signed by the artist using their personal signature seal or *hanko.*

In continental Europe the first record of rubbings from monumental brasses appeared in the early thirteenth century. These 'dry' techniques were widely used in England from the late thirteenth century to the seventeenth century. Dry paper was placed on top of a monument and an image produced by rubbing with a mixture of carbon black and wax called a heelball. There was a revival of interest in the mid nineteenth century and it became such a popular past-time in the 1970's access to historical monuments was restricted for preservation purposes and brass rubbing societies were able to take rubbings from replicas of the originals. Monumental brasses were made as memorials for deceased people or persons and are formed of two parts: an engraved metal plate (brass) containing the memorial and the casement a stone slab in which it is set (Bertram, 1973). Rubbing's were also taken from incised stone slab memorials from the eleventh to seventeenth century. The Ashmolean Museum built a large collection of rubbings between the 1840's to 1910 which contains mainly English rubbings and examples from Europe.

The artist Max Ernst (1881-1976) first made use of a dry rubbing technique in 1925, which he named 'frottage' from the French, 'to rub'. Ernst declared his fear of the blank canvas or page was overcome by starting a work with frottage. A series of frottage works later developed into one of his most famous artists' books *Histoire Naturelle* (Spies, 1986). The title of Ernst's book was inspired by *Naturalis Historia* or the Natural History book by Pliny the Elder (25-79 C.E.).

Many nature printers and *gyotaku* practitioners include rubbings as part of their repertory of techniques. One such person is the late Eizo Doh-ken Kubota (1923-2005) recognised with his wife Nanjo as Honorary Lifetime Members of the Nature Printing Society:

> "Eizo was trained in calligraphy and later in tenkoku (seal engraving) by the famous Japanese calligrapher Kindoh Hayashi. He was later given the name "Doh-ken" as a tribute to his mastery of the art of tenkoku. Examples of his beautiful seal engravings have been exhibited in numerous galleries and museums in Japan and the US. Eizo also studied *takuhon* (stone rubbing) with the famous artist Chie Motoyama. In addition, he was an expert in handmade paper and collaborated with Nanjo by mounting and framing all of her *takuga* prints" (Hochberg, 2006, p.1).

Another member of the Nature Printing Society who has been adapting rubbing techniques and the indirect *gyotaku* technique to create 'composite' rubbings of ceramic vessels (Figure 135) is Paul Blake. He presented and taught the technique at the annual NPS workshop in Oregon, USA (September, 2013). The technique developed by Paul Blake makes it possible to create an image to a particular size and design. He explains:

> " the difference here from fish is that we will design the pot first on silk and then print to the design. This is printing by design: any shape and any size. The whole idea of printing to design has opened many new ideas for me. I am currently finishing a pot piece featuring octopus pot fishing in Portugal" (personal communication, August 6, 2013).

His rubbing using this method, combined with nature printed leaves and a seed pod titled *Pai-Pai Pottery a Tribute to Daria Mariscal* is in the permanent collection of the Barona Cultural Center and Museum, Lakeside, California, USA. The print is signed in pencil and in red ink with Paul's personal 'chop mark' or *hanko* in the bottom right hand corner.

Figure 135 - Left: photo of the ceramic pot. Right: composite rubbing print made by Paul Blake. Photos courtesy of Paul Blake.

8.8. Signature Seals

In addition to rubbing techniques the Chinese developed 'seals':

> "The use of seals in China can be traced back to the Shang dynasty. Three old square seals, cast in relief on a flat surface of bronze, are said to have been found at Anyang, while later seals made of bronze, gold, jade and turquoise, and soapstone in various shapes and sizes, dating from Chou, Chin and Han dynasties, have been discovered at various sites in China" (Needham & Tsuen-Hsuin, 1985).

Ancient seals were made from all kinds of hard-surface materials including cast metal. The majority of ancient cast seals were made with characters in relief and only a small number of specimens have intaglio inscriptions. Initially, these were used for stamping onto clay and later onto silk, and paper including rubbings, calligraphy, paintings, official documents and paper currency. The technique for carving a mirror image seal is considered by many to be one of the technical precursors to the development of printing. The art of seal carving can be likened to that of Chinese calligraphy in the sense that a line does not allow for any re-touching.

There are many classes of personal seal and official government authority seals. But in basic terms the three main types of seal are the 'signature seal', the 'collectors seal' and the 'phrase' or

'saying seal'. The 'signature seal' can be for personal use, or the signature of a family for example Chinese Emperors, their families and the officials who worked for them or the signature of an artists studio. Seals are integral part of a work of art and play an important role in the composition. It does not serve merely as a form of identity but is placed in such a way as to enrich the content of the work and add another layer of meaning. Any work of art that does not bear a seal is considered worthless or decreased in value. 'Signature seals' can be formed from the first name, family name, a given name or a painting name (hao). The 'collectors seals' which are often found on Chinese art works representing ownership and appreciation of a particular work, and those who have seen the art work. 'Collectors seals' should only be placed in a non-aggressive fashion at the side of an art work or manuscript so as not to invade the space. An individual work may contain several dozen seals with a variety of scripts and names which are useful aids to dating works. Thirdly, seals bearing phrases or sayings (*xian zhang*) are used to compliment calligraphy and painting. These are usually placed in one or more corners of the art work. The most common seal shapes are square, round and rectangular.

Since the fifth century seals were generally applied with vermilion coloured ink called *zhūshā,* and some scholars believe the use of red ink may have occurred earlier as paper documents written in black ink were produced in the second and third centuries. Throughout the centuries the common source of Chinese red for inks was cinnabar, a highly toxic substance which was banned in the manufacture of paints and inks in the nineteenth century and replaced by synthetic cadmium red.

Modern red pigments are very controllable and are mixed with glue and used in stick form, as an aqueous solution or made into the sticky seal ink called *yinse.* "In commenting on coloured seal impressions, one needs to mention the traditional Chinese practice of using blue seal ink for a period of months-twenty-four or twenty-seven, varying with the informant following the death of a parent" (Starr, 2008, p.187).

Japanese signature seals are generically known as *hanko or inkan.* Seal engraving is called *tenkoku,* and engraving by hand is considered a highly skilled art. The written signature is not legally valid in Japan and each person residing there must carry an everyday seal for reviving registered post, delivery notes, receipts and other routine documentation. This is called a *motomein* and it is formed from a rubber stamp. The ink used is a liquid ink on a self-inking pad housed in the cover or on an ink pad. The *ginkoin* is a more formal *hanko* and is used for banking. Therefore, they are made from hard bamboo. *Jitsuin* which are guarded carefully are only used for transactions such as purchasing a house or car and are often more elaborate and hand carved (Lowe, 1983). *Hanko* used by artists are often designed and made by a master craftsman who will specialise in making a particular type of seal. These are inked with an almost solid ink which contains some oil to prevent it from drying out. While Japanese woodblocks for prints are engraved on the cross grain, wooden seals are engraved on the curly grain. Valuable materials such as precious stones can be used but the quality of the seal depends on the engravers skill. Decorative seals and antique seals are collectable.

Traditionally non-Japanese prints are signed by the artist with an HB pencil at the bottom of the print or occasionally on the print or the reverse side of the paper. A number of the edition, the title signature and sometimes the date are included. Some artists' publishers also add an embossed mark, which they call the chop mark, not to be confused with the common name for signature seals. Many non-Japanese *gyotaku* practitioners make use of traditional formats for signing prints but in recognition of the oriental art form also use a signature seal (Figure 136) whether this has been made for them with Japanese characters, or a modern rubber stamp of their own design, or simply hand cut onto erasers, linoleum or wood.

Figure 136 - A selection of seals bearing the artists' name Kawa Magatta or River Winding' in English carved by Joe McAuliffe in the years 2000, 2001, 2003, 2003 and 2004 (from left to right). Image courtesy of Joe McAuliffe.

Figure 137 - 'Trigger Fish' by Steve Thurston. Direct *gyotaku* with woodcut print in a limited edition of 5, signed and printed with signature seals. Image courtesy of Steve Thurston.

Another example of a contemporary seal can be seen in Steve Thurston's work. Thurston designed his signature seal from the initials of his name S and T (Figure 137). The S is in the form of a snake which is Thurston's karate animal ally. The seal was hand carved from a piece of teak wood and printed using oil based block printing ink.

8.9. Contemporary Ink Rubbing

Evidently the history of rubbings and seals relates to the history of printing and perhaps to the origins of *gyotaku*. However, the practice and display of ink rubbings continues in the Far East and is recognised as both a method for recording archaeological items and historical monuments, a technique used by professional artists, and as an interesting hobby. Master Kasyu Yabuta draws attention to the attributes of contemporary Japanese ink rubbing and those who practice this as considered by the *Takuhon* Society in Japan on their website at http://www. takuhon.com:

> "You are someone who enjoys *takuhon.* You visit monuments inscribed with a poem or stone tablets inscribed with images. And while you are making a rubbing you also absorb the image and it gives you a feeling of history and literature. You take away with you an image (rubbing) and a feeling and you have fun making a scroll or screen from your rubbing. It is a very quiet and peaceful hobby. (Attention) *Takuhon* IS NOT *Gyotaku* (Fish Print)!" (Takuhon, n.d.).

In China the contemporary art of ink rubbing is thriving and the technique is taught in many Universities and academies. Traditional ink rubbing techniques have been used by famous Chinese artists such as Qiu Zhijie (b. 1969), in his work titled 'Monuments: Revolutionary Slogans of Successive Dynasties' made in 2007, which consists of sixteen ink rubbings on paper each one measures 34.3 inches x 34.3 inches, and 'Monuments: International Politics' which consists of sixteen ink rubbings on paper each one measures 26.3 inches x 25.9 inches (Sans & Xiaoyan, 2010). These works have been exhibited in prestigious galleries in China and formed part of the 'Philagrafika 2010' Philadelphia's international festival celebrating print in contemporary art. Philagrafika was held over three months and involved more than three hundred artists. It was one of the largest art events in the USA and the world's most important print-related exposition. Xu Bing (b. 1965) has also utilised traditional ink rubbing in his monumental work titled 'Ghost Pounding the Wall'. Made in 1990 the thirty two metres long by fifteen meters high installation consists of ink rubbings taken from a section of the Great Wall of China and a mound of earth (Erikson, 2001). Art works such as these use ink rubbing not merely to create a record of an object but reflects on the

tradition of printmaking and the printed image in China, and on how personal and collective memory are intertwined.

8.10. *Gyotaku* Experiments with Paper and Inks

To complement the written research in this chapter a series of practical experiments were performed with a selection of contemporary materials readily available to today's *gyotaku* practitioners. Although all the inks, papers and brushes undergo thorough quality control tests during manufacture the aim was to discover how these materials behave during and after the *gyotaku* direct printing technique as they are developed for relief printing or 'oriental arts' and not specifically for *gyotaku*.

8.10.1. Materials and Methods

The direct technique was chosen because it is one which is often used today when first attempting to make *gyotaku,* and it is still used by fishermen to record their catch as it is a relatively quick in comparison to the indirect technique. Direct *gyotaku* produces a strong graphic image and yet retains detail. Because the ink is applied directly to the surface of a thoroughly clean, dry fish it is easier to determine how the inks react and to establish the 'pick' of an ink as the paper needs to peel away evenly from the inked body of a fish without leaving fibres. Even though each fish is thoroughly cleaned and dried in preparation for printing, the ink is applied to the fish rather than onto the paper as in the indirect technique.

8.10.1.1. Studio Conditions

Gyotaku prints can be made in numerous locations: on-board boats, in the open air, beside the sea or on a river bank, etc. However, relatively stable conditions are needed to make a comparison of how different materials behave. For this reason the experiments were performed under studio conditions as they offered a more controllable and reproducible environment. The studio was located in the basement of a house which has an approximate area of 250 m^2 and 2.2 meters in height. It has ample ventilation, running water and electricity, creating an ideal environment in which to conduct the experiments.

8.10.1.2. Health & Safety

One of the prime concerns for contemporary printmakers is not only the health issues and working environment regarding the use of art materials but also the effects they may cause on the environment. Legally print studios need to follow the legislation in whatever country they are located regarding materials and manufacturers are required to label and provide the necessary data about all art products. Increasing numbers of artists are also keeping their own health and safety data regarding the materials they use and like the majority of *gyotaku* practitioners they are opting to work with the most environmentally friendly, safe and non-toxic products.

> "The major item that has revolutionised the relationship between the ink makers and the printer has been the MSDS. The document advises the printer of the exact content (of those hazardous materials only) of the product that is being purchased. This enables the printer to request the ink maker to make changes when specific chemicals in a formulation are not desired. These considerations may be for safety or compliance regulations" (Laden, 1997, p.6).

The Material Safety Data Sheets (MSDS) were acquired for each ink to be tested and an evaluation was made of the safe working practices required in the printmaking studio and any environmental issues surrounding waste disposal. Also, because the inks were made in different countries the following labels are explained below.

AP is the Approved Product Seal of the Art and Creative Materials Institute, products carrying this label have been tested to show that they do not contain any materials in sufficient quantities to be toxic or injurious to humans or to cause acute or chronic health problems.

With American art materials packaged in sizes intended for individual users of any age or those practising in groups the products should bear the label to state it has been tested and conforms to the ASTM D4236. ASTM International was known until 2001 as the American Society for Testing and Materials (ASTM).This labelling is a standard practice for the USA. Within Europe printmakers inks need to conform to legislation set by the European Community which includes CLP (Classification, Labelling and Packaging of substances and mixtures) which aligns previous European Community legislation to the GHS (Globally Harmonised System of Classification and Labelling of Chemicals. Also, it is necessary to provide safety data sheets (SDS) for each product.

8.10.1.3. Choice of materials: Ink

All the inks chosen for the practical *gyotaku* experiments were black due to the fact that it is the easiest colour to see once printed. There are different shades of black from warm reddish hues to colder bluish shades of black. My choice was dictated by those blacks available from a particular manufacturer. “Black has been and always will be the most widely used colour in printing” (Bloy, 1972, p.42).

8.10.1.4. Choice of materials: Paper

Seven different types of Japanese paper were chosen as each is an appropriate size to print fish, they can be purchased outside of Japan, they are inexpensive and the types of papers which *gyotaku* printers often choose for the direct *gyotaku* technique. The names, dimensions and characteristics of each paper tested can be seen in table 1.

8.10.1.5. Choice of Fish

The common name in English is scad or horse mackerel, Latin name *Trachurus trachurus* (Linnaeus). This fish has a well-defined eye socket, lateral line and tail (Davidson, 2012) which should result in an easily readable print. Also, for cleaning purposes this fish has a minimum amount of mucous and is generally inexpensive. If the fish is not thoroughly dry before printing the ink may 'bleed' as seen in Figure 138. Therefore, it is crucial that care and attention is paid to ensure the correct preparation of fish ready for printing. At the time of printing various observations were recorded which included; the date of testing, general weather conditions, the relative humidity and temperature.

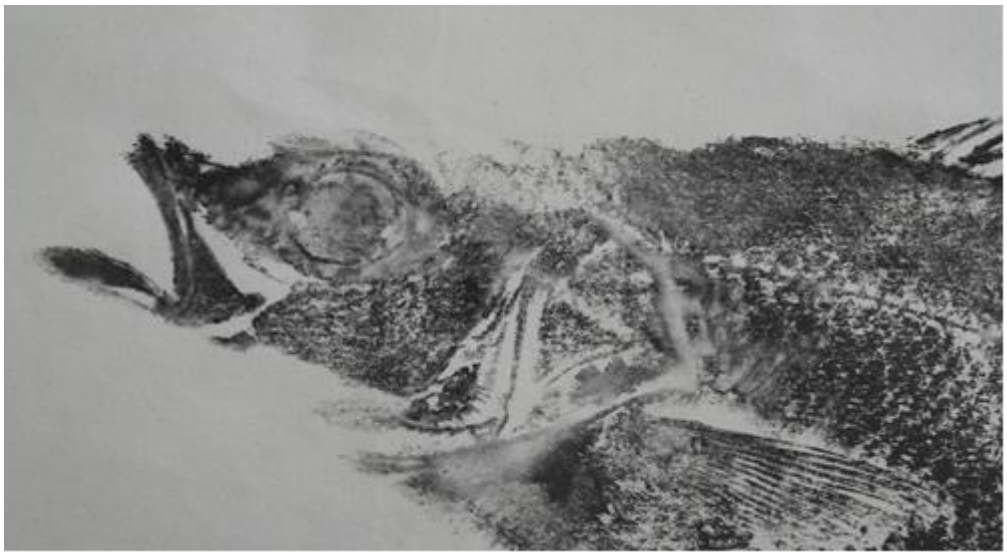

Figure 138 - A fish head direct *gyotaku* demonstrating ink 'bleed'.

- **Humidity** is particularly important to printmakers as it affects the paper and ink. High humidity can result in problems with the registration of colours and the drying times of the inks. The relative humidity for the studio was recorded using a digital device.

- The **temperature** of the studio environment during the experiments was comfortable and did not adversly affect either the inks or papers being tested. However, extremes in temperatures for example minus ºC or over 30ºC can affect the inks by reducing the flow in cold temperatures and increasing the flow in warm conditions. Papers may be affected by extrme temperatures although the changes are not as easy to detect as with inks. In warmer conditions papers may dry out if the relative humidity is low and when handling such papers they may feel less flexible. This may also be found in colder conditions when combined with a low relative humidity.

- **Mixing**: The ink was mixed without the addition of driers, thickener, tack reducers or any other materials. Was it easy to mix and how viscous was the ink?

- **Aroma:** Did the ink have a particularly noticeable smell? Did it change upon contact with the fish and was it detectable after the prints had been dried for 96 hours (4 days)? This drying time was chosen as it is ample time for the inks to dry thoroughly, according to the details concerning the drying times of the inks which were supplied in the manufacturer's product details.

- **Application:** Coating the fish with ink using a synthetic flat head brush. How easy was the ink to apply?

- **Printing:** How easy was the fish to print did the colour penetrate the paper to the back?

- **Release:** Did the paper peel away easily from the fish without tearing? How much ink was left on the fish?

- **Pick:** Are any paper fibres pulled away from the surface of the paper by the ink?

- **Cleaning up:** What materials were used to clean up the fish at the end of printing, how easy was the fish to clean?

Once the print has been left to dry for 96 hours. The following tests were made:

- **Water Resistance,** important as sometimes the artist may wish to paint colour over the top of the *gyotaku* or on the reverse side of the paper.
- **Scratch Resistance**, a coin was drawn across the surface.
- **Rubbing,** the printed paper was rubbed with a piece of acid free cartridge paper.
- **Stability,** is the overall coverage of the ink without additives, does the edges of the ink bleed or feather into the paper or is the line sharp?
- **Colour quality** or the appearance, did it give rich solid blacks or a blotchy or speckled appearance?

The papers tested are indicated along with key characteristics in the tables below. The papers are numbered one to seven and this numbering is used to refer to each paper throughout the subsequent text as shown below in Table 1.

Table 1 - Papers tested indicated by a number with their characteristics.

Number	Name	Weight	Dimensions	Description
1	Awagami Kitakata	36 g/m²	520 x 430 mm	Handmade, Neutral PH, 90% Philippine Gampi 10% wood pulp, Hardboard dried, cream colour with 4 deckle edges
2	Awagami Mitsumatashi	31 g/m²	970 x 640 mm	Handmade, Neutral PH, 100% Mitsumata, Hardboard dried, soft white colour with 4 deckle edges
3	Awagami Okawara Student	51 g/m²	450 x 640 mm	Handmade, Neutral PH, 50% Kozo 50% Manila Hemp, natural white colour, 2 deckle edges
4	Awagami Unryu	43 g/m²	940 x 636 mm	90% Kozo 10% wood pulp,bright white colour with random fibres, 2 deckle edges
5	Hosho	mid-weight	280 x 400mm	Bright white, 4 cut edges
6	Kozo	light-weight	939 x 636mm	Natural slightly greenish colour, laid lines, 4 cut edges
7	Shuji Gami	light-weight	18” x 30' roll	Machine made, Kozo, Bright white, 2 cut edges

Table 2 - A scale of marks from 10 -1, indicating the properties of an ink when used for direct *gyotaku*.

Scale of Marks	Properties
10	FAULTLESS
9	EXCELLENT
8	VERY GOOD
7	GOOD
6	FAIR
5	AVERAGE
4	BELOW AVARAGE
3	POOR
2	EXTREMELY POOR
1	UNUSABLE

Table 3 - The overall score for the performance of each ink tested using direct *gyotaku*.

Inks tested	score	Rank
Sumi (Liquid ink)	695	2
Akua Kolor, (Lamp Black)PB k 7 / PB 15 intense	627	3
Speedball Water Soluble Block Printing Ink (3600 Black)	623	5
Daniel Smith Water Soluble Relief Ink (Lamp Black)	562	7
Graphic Water based Block Print (Lamp Black Nº 1450A)	626	4
Caligo Safe Wash Relief Ink Black (BKCJ1860)	714	1
Graphic Oil Base Block Print Black (2202A)	616	6

8.10.2. Results

The detailed results for each ink tested with the seven different types of papers can be seen in the annex to the chapter 'Annex: data from experiments with inks and papers.' Each individual print made using the *gyotaku* method will be slightly different because of the pressure applied during printing despite the fact that all the prints were made by trying to use the same even pressure for each one. The difference between two different types of paper both printed with *sumi* ink can easily be seen in Figure 139.

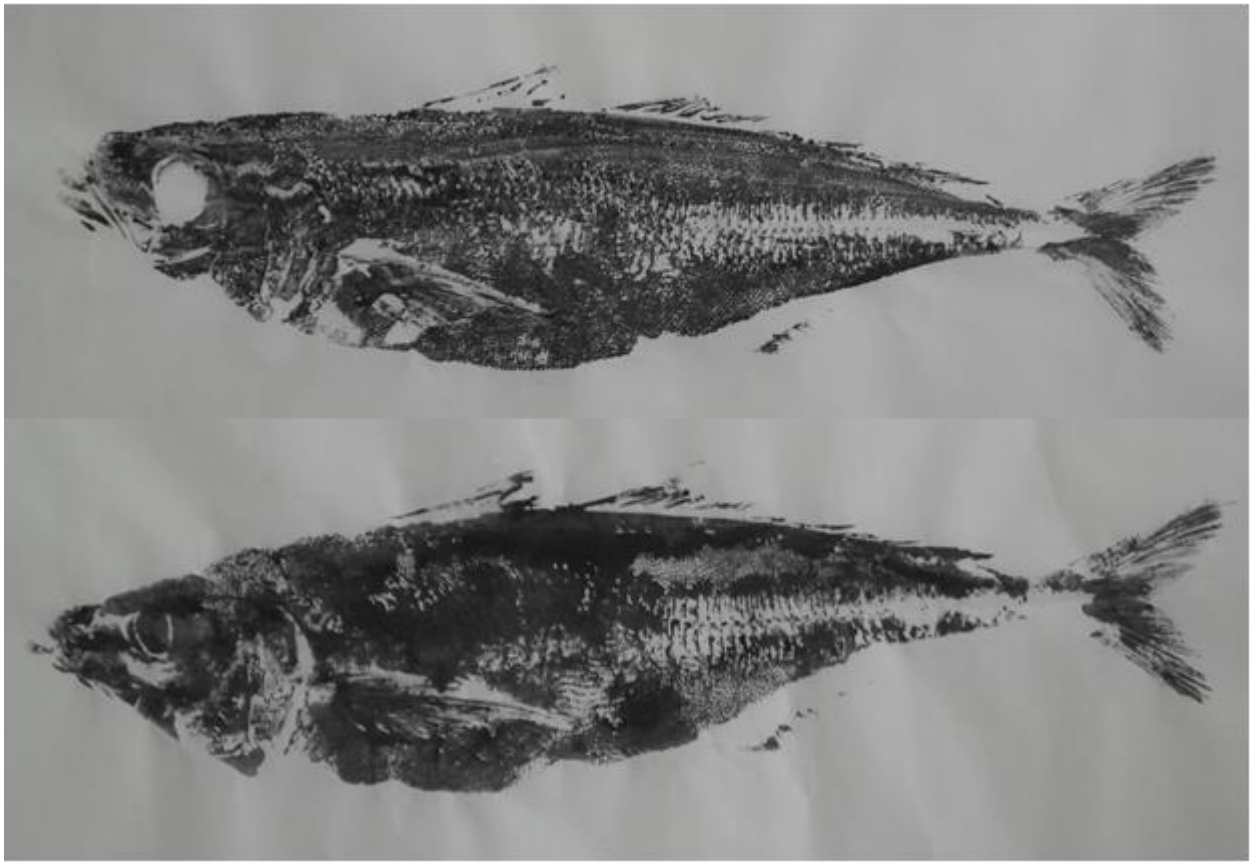

Figure 139 - Two prints in liquid *sumi* ink demonstrating the differences in each print. Above: *Hosho* lightweight paper. Below: *Kozo* natural lightweight paper. *Hosho* paper is more absorbent that *Kozo* paper.

8.10.3. Discussion and conclusions from the ink and paper experiments

It is recommended that however clean a fish may appear after printing it should be skinned and the tail, fins and head removed before cooking. A lot of ink gathers around the gills, mouth, eyes and nostrils so it is easier to remove the head rather than trying to clean these difficult areas. However, if the fish is to be frozen and printed at a later date the ink should be removed and the fish should be dried and placed inside a plastic freezer bag Care should be taken with all the inks when painting colours on top to ensure that they do not smudge or re-wet in any way. Ironing helps to 'set'

the inks although this may not always be possible or recommended depending upon the substrate used.

The seven inks which were tested were given a score ranging from 10 for faultless to 1 for unusable (as indicated in Table 2). After careful consideration each ink was given a score for each different property of the ink. The comments were taken into account and the scores were added together to give the total as seen in table 3. It should be taken into account that these results are based on my findings which are subjective and in no way reflect the quality of the inks from the various manufacturers, only the way in which I worked with the inks. The only noticeable difference in the choice of paper was the Awagami Unryu because of its decorative fibres. This sometimes made the inks appear to spread, although on closer examination of these prints once they were dry this is not particularly noticeable. All papers were soft, lightweight, pliable and strong so therefore all of them are ideally suited for *gyotaku* printing and people will inevitably find their own particular favourites. The papers with a softer white, cream or natural coloured papers were visually pleasing to me rather than the bright whites of the *Hosho* and *Shuji Gami* papers. The papers were used dry and the inks were not mixed with any modifiers, retarders or vehicles. However, all the papers are suitable for damping and many of the inks have their own modifiers which make them more versatile.

The ink with the overall best performance on all types of paper was the Caligo Safe Wash Relief Ink (as seen in

Table 9). This ink is easy to use and gave clear detailed results. Although the *sumi* liquid ink (Table 4) was difficult to apply because it was difficult to see how much was too much it was the best second best ink because it became part of the paper, it dried quickly on the paper and did not re-wet when water was applied. With practise this would be one of the most versatile inks to use for diverse subject matter. The third best performance came from Akua Kolor (Table 5) which like the *sumi* ink would take time to practise the application of the ink. Once this is mastered the ink would be easy to use and gave very good results.

The only ink which I found difficult to use was the Daniel Smith ink (Table 7) because it felt rubbery and seemed to dry quickly on the fish. However, many *gyotaku* practitioners in the USA prefer to use this ink rather than any other. This was the first time that I have used the Daniel Smith inks and I believe that with more practise this ink would be easier to work with.

My own personal preference from these experiments is the Caligo Safe Wash ink used in combination with the *Kozo* light-weight natural paper. This advantages of this ink is that it is easy to use, economical and 'non-toxic'. The manufacturers are particularly helpful and provided a wealth of information regarding the products use and welcomed any feedback, questions or requests concerning their products. The qualities of *Kozo* paper which are particularly appealing are it size (Table 1) as it is large enough to tear into smaller sheets, it is reasonably priced and has a good visual appearance because the laid lines do not interfere with the printed image. The *Kozo* paper has two sides one with a slight sheen the other with a matt appearance and more absorbency, which is similar to many Japanese papers and allows the *gyotaku* practitioner greater choice when creating a work, plus its wet strength makes *Kozo* paper an ideal choice for *gyotaku*.

Annex: data from experiments with inks and papers

Table 4 - *Sumi* (Liquid ink)

INK		*Sumi* (liquid ink) Made in Japan.					
DATE OF PRINTING		31/01/13					
WEATHER		Over cast dull sky, raining at times throughout the day.					
TEMPERATURE		15ºC					
HUMIDITY %		78					
PAPERS	1	2	3	4	5	6	7
Mixing ink	9	9	9	9	9	9	9
Aroma	8	8	8	8	8	8	8
Application	8	8	8	8	8	8	8
Printing	7	7	8	5	6	5	5
Release	9	9	9	9	9	9	9
Pick	10	10	10	10	10	10	10
Clean up	5	5	5	5	5	5	5
DATE OF TEST		05/02/13					
WEATHER		Very bright sky but no sun. Showers in the morning.					
TEMPERATURE		13ºC					
HUMIDITY %		73					
PAPERS	1	2	3	4	5	6	7
Colour quality	9	9	8	7	8	8	8
Rubbing	10	10	10	10	10	10	10
Scratch	10	10	10	10	10	10	10
Stability	9	9	8	6	8	8	8
Water resistance	8	8	8	8	8	8	8
Total Score	102	102	101	95	99	98	98

COMMENTS: Grand Total 695

Sumi ink has a pleasant chalk like smell. It is very easy to apply to the fish although great care has to be taken to keep everything clean as this ink is difficult to clean off both from the fish and the table. The ink becomes part of the paper and doesn't sit on top. A greater level of skill is necessary to achieve a detailed print because I found that I had often applied too much *sumi*. However, this ink would be excellent for use in the Hawaiian method of *gyotaku*. I would recommend skinning the fish before cooking it as it was left with a black stain after printing. It is good for absorbent papers and because Japanese papers often have two different sides the non-shiny side produced better results.

Table 5 - Akua Kolor

INK		Akua Kolor (Lamp Black) PBk 7 / PB 15 intense					
DATE OF PRINTING		31/01/13					
WEATHER		Overcast dull sky, raining at times throughout the day.					
TEMPERATURE		15ºC					
HUMIDITY %		78					
PAPERS	1	2	3	4	5	6	7
Mixing ink	7	7	7	7	7	7	7
Aroma	7	7	7	7	7	7	7
Application	8	8	8	8	8	8	8
Printing	7	7	7	6	7	7	7
Release	9	9	9	9	9	9	9
Pick	8	8	8	8	8	8	8
Clean up	6	6	6	6	6	6	6
DATE OF TEST		05/02/13					
WEATHER		Very bright sky but no sun. Showers in the morning.					
TEMPERATURE		13ºC					
HUMIDITY %		73					
PAPERS	1	2	3	4	5	6	7
Colour quality	8	8	8	7	9	8	9
Rubbing	7	7	7	6	7	7	7
Scratch	8	8	8	7	8	8	8
Stability	8	8	9	7	8	8	8
Water resistance	7	7	7	7	7	7	7
Total Score	90	90	90	85	91	90	91

COMMENTS: Grand total 627

Akua Kolor ink needed a really good shake to mix the pigments with the liquid. It states that fact on the label. The aroma is OK. Very difficult to tell any difference between papers. Nº. 4 Awagami Unryu seemed to be the most absorbent. Difficult to clean up as this ink stains the fish so as with *sumi* I would recommend skinning the fish before cooking. Easy to apply but difficult to tell if there is too much ink on the fish because of the inks liquid nature it is easy to apply too much without the appearance of too much ink.

Table 6 - Speedball Water Soluble Block Printing Ink

INK	Speedball Water Soluble Block Printing Ink (3600 Black)						
DATE OF PRINTING	31/01/13						
WEATHER	Overcast dull sky, raining at time throughout the day.						
TEMPERATURE	15º C						
HUMIDITY %	78.00%						
PAPERS	1	2	3	4	5	6	7
Mixing ink	8	8	8	8	8	8	8
Aroma	7	7	7	7	7	7	7
Application	8	8	8	8	8	8	8
Printing	7	7	8	6	7	7	7
Release	8	8	8	8	9	9	9
Pick	9	9	9	8	8	8	8
Clean up	7	7	7	7	7	7	7
DATE OF TEST	05/02/13						
WEATHER	Very bright sky but no sun. Showers in the morning						
TEMPERATURE	13ºC						
HUMIDITY %	73.00%						
PAPERS	1	2	3	4	5	6	7
Colour quality	8	8	7	7	8	8	8
Rubbing	6	6	7	6	7	7	7
Scratch	7	7	7	7	7	7	7
Stability	8	8	8	7	8	8	8
Water resistance	6	6	6	6	6	6	6
Total Score	89	89	90	85	90	90	90

COMMENTS: Grand total 623

This ink looks very similar to black acrylic paint and has the same smooth texture. Very little aroma, easy to mix and apply. I particularly liked the fact that the 150cc plastic tube with white a screw top lid was transparent, allowing one to see how much ink is in the tube. It was the easiest ink to dispense. All the information is printed on the tube rather than a paper label so it's always easy to keep clean and see the details. This includes the ASTM and AP (Approved Product) signs. The water resistance is not so good even though the ink appeared thoroughly dry when testing. Cleaned up reasonably well with soap and water.

Table 7 - Daniel Smith Water Soluble Relief Ink

INK	Daniel Smith Water Soluble Relief Ink (Lamp Black)						
DATE OF PRINTING	01/02/13						
WEATHER	Showers, blue sky and sunshine.						
TEMPERATURE	11ºC						
HUMIDITY %	62.00%						
PAPERS	1	2	3	4	5	6	7
Mixing ink	7	7	7	7	7	7	7
Aroma	8	8	8	8	8	8	8
Application	6	6	6	6	6	6	6
Printing	6	6	6	5	7	6	6
Release	7	7	7	6	7	7	7
Pick	8	8	8	7	8	8	8
Clean up	6	6	6	6	6	6	6
DATE OF TEST	05/02/13						
WEATHER	Showers, dull grey sky, bright light, no sun.						
TEMPERATURE	13ºC						
HUMIDITY %	70.00%						
PAPERS	1	2	3	4	5	6	7
Colour quality	7	7	7	7	7	7	7
Rubbing	6	6	6	5	6	6	6
Scratch	8	8	8	7	8	8	8
Stability	7	7	7	6	7	7	7
Water resistance	5	5	5	5	5	5	5
Total Score	81	81	81	75	82	81	81

COMMENTS: Grand total 562

This ink had a rubbery like texture and dried too quickly. This was the most difficult ink to work with as it was stiff to apply and not very water resistant once dried. The different papers did not appear to make any significant difference to the printing. Modifiers/retarders are required for use with this ink.

Table 8 - Graphic Water-Based Block Print Ink

INK		Graphic Water-Based Block Print (Lamp Black Nº. 1450A)					
DATE OF PRINTING		01/02/13					
WEATHER		Showers, blue sky and sunshine.					
TEMPERATURE		11ºC					
HUMIDITY		62.00%					
PAPERS	1	2	3	4	5	6	7
Mixing ink	9	9	9	9	9	9	9
Aroma	8	8	8	8	8	8	8
Application	7	7	7	7	7	7	7
Printing	8	7	7	6	7	8	7
Release	8	8	8	7	8	8	8
Pick	8	8	8	8	8	8	8
Clean up	7	7	7	7	7	7	7
DATE OF TEST		05/02/13					
WEATHER		Showers, dull grey sky, bright light, no sun.					
TEMPERATURE		13ºC					
HUMIDITY		70.00%					
PAPERS	1	2	3	4	5	6	7
Colour quality	8	8	8	7	8	8	8
Rubbing	7	7	7	6	7	7	7
Scratch	8	8	8	7	8	7	7
Stability	7	7	7	7	7	7	7
Water resistance	6	6	6	6	6	6	6
Total Score	91	90	90	85	91	90	89

COMMENTS: Grand total 626

Very little aroma. Stiff to mix but became more pliable with time. Stable and yet like most of the water-based inks care should be taken concerning water resistance to ensure that inks are really dry and if painting colours over the top that these do not re-wet. The paper did not make a great deal of difference to the printed appearance of the ink.

Table 9 - Caligo Safe Wash Relief Ink

INK		Caligo Safe Wash Relief Ink Black (BKCJ1860)					
DATE OF PRINTING		02/02/13					
WEATHER		Sun. Dark sky over the hills					
TEMPERATURE		14ºC					
HUMIDITY %		56					
PAPERS	1	2	3	4	5	6	7
Mixing ink	9	9	9	9	9	9	9
Aroma	9	9	9	9	9	9	9
Application	9	9	9	9	9	9	9
Printing	9	9	9	9	9	9	9
Release	9	9	9	9	9	9	9
Pick	9	9	9	9	9	9	9
Clean up	8	8	8	8	8	8	8
DATE OF TEST		07/02/13					
WEATHER		Rain					
TEMPERATURE		12ºC					
HUMIDITY %		77					
PAPERS	1	2	3	4	5	6	7
Colour quality	9	9	9	9	9	9	9
Rubbing	8	8	8	8	8	8	8
Scratch	8	8	8	8	8	8	8
Stability	8	8	8	8	8	8	8
Water resistance	7	7	7	7	7	7	7
Total Score	102	102	102	102	102	102	102

COMMENTS: Grand total 714

Very little aroma. Easy to mix and apply to the fish. This ink did not dry out during the printing and was very stable. Caligo sent full instructions concerning water resistance with tips about how to improve this. Cleaning up was good with soap and water. Vegetable oil is also good for cleaning up. There was very little difference in the performance of the ink with the papers used they all appeared to print easily and did not have any pick.

Table 10 - Graphic Oil-Based Block Print Ink

INK		Graphic Oli-Based Block Print Black (2202A)					
DATE OF PRINTING		02/02/13					
WEATHER		Sun. dark sky over the hills.					
TEMPERATURE		14ºC					
HUMIDITY %		56					
PAPERS	1	2	3	4	5	6	7
Mixing ink	7	7	7	7	7	7	7
Aroma	8	8	8	8	8	8	8
Application	7	7	7	7	7	7	7
Printing	8	8	7	7	8	8	8
Release	8	8	8	7	8	8	8
Pick	8	8	8	7	8	8	8
Clean up	6	6	6	6	6	6	6
DATE OF TEST		07/02/13					
WEATHER		Rain.					
TEMPERATURE		12ºC					
HUMIDITY %		77					
PAPERS	1	2	3	4	5	6	7
Colour quality	8	8	8	7	8	8	8
Rubbing	7	7	7	6	7	7	7
Scratch	8	8	8	7	8	8	8
Stability	7	7	8	6	7	7	7
Water resistance	7	7	7	7	7	7	7
Total Score	89	89	89	82	89	89	89

COMMENTS: Grand total 616

A rich, oily textured ink, creamy and easy to mix. Very little aroma. Good colour coverage, release and no pick. Needed plenty of time to clean up as the pigment seemed to stain things.

Not much visible difference in the ink concerning the papers used. Generally Unryu appears different from the other papers because it seems more absorbent and the decorative fibres are very visible.

9. Conclusions

The study explores the concept of *gyotaku* and attempts to identify its origins and the nature of its relationship with art and science, including the 'art of fishing'. Firstly I describe the three main questions of my research and provide a synthesis of the key findings from my study specifically;

What is *gyotaku* and what are its origins?

What is the nature of *gyotaku's* relationship with science, primarily in terms of the natural history illustration of aquatic fauna and flora?

What is the nature of *gyotaku's* relationship with visual art, primarily in terms of printmaking and the 'art of fishing'?

The main reasons that this research is important are:

- There is a limited amount of information concerning *gyotaku* available in English and none which places this printing process in the historical context of art and natural history illustration (science). This study provides a comprehensive examination of *gyotaku* in relation to contemporary printmaking practice and print culture. The general theoretical literature concerning *gyotaku* needs to be re-examined and updated. For example many English publications are vague or offer various dates for the oldest extant *gyotaku* print in Japan. I have tried to clarify this and provide information from Japanese sources which claims that the earliest extant *gyotaku* print in Japan was made in 1939. This is a direct *gyotaku* of a Japanese crucian carp also called the white crucian carp, *Carassius cuvieri,* which is currently housed in the Tsuruoka archives in Yamagata prefecture, Japan. Also, the exact origins of *gyotaku* are

inconclusive. *Gyotaku* appears to be a printmaking process which perhaps only has a recent history, but has been marginalised (until fairly recently) and thought of as either ephemeral (trophy prints) or of little aesthetic value and therefore an in-depth study of *gyotaku* does not exist. Because an increasing number of people are using various *gyotaku* techniques and making their own variations of these, it is important to examine, to record and to discuss the works of contemporary practitioners. Also, to question if their work in terms of subject matter and technical process can be defined as *gyotaku* and to document their work before this information is lost or inaccurately recorded.

- In today's climate of concern for the health and safety of those working with printmaking materials and processes and the known environmental impact that the commercial printing industry and individuals can have (if safer practises are not adopted and the legislation regarding the handling and disposal of waste is not conformed to), I argue that *gyotaku* offers a safer approach to printmaking with little environmental impact. There is an ever increasing amount of research, awareness and worldwide use of 'non-toxic', 'eco-friendly' or 'safer approaches to printmaking'. Therefore, a study of *gyotaku* places this process in context of current printmaking research and environmental issues.

- *Gyotaku* is an easily accessible activity which does not require a large amount of material or the use of a printing press. Therefore, *gyotaku* is an excellent and relatively inexpensive educational tool. *Gyotaku* encourages the crossing of boundaries (which may exist) between subjects such as art, science, history and socio-cultural studies. As it has spread from Japan to the rest of the world it has enabled a greater understanding of Japanese culture and helps to foster peace and the appreciation of nature. As can be seen in this study the majority of *gyotaku* practitioners are involved in a number of wildlife and environmental conservation projects as well as practising 'catch and release' fishing. At the same time *gyotaku* can be used to raise our awareness about

environmental issues such as climate change and the effects of pollution and overfishing in the hope that legislation can be introduced to safe guard our aquatic environment and source of food for future generations.

I demonstrate the implications of my findings and explain what my research means in terms of the practice of *gyotaku* and an understanding of the subject in relation to the history of printmaking and contemporary visual art. I evaluate the outcomes of this study and its contribution to the existing body of knowledge and understanding concerning *gyotaku*. Secondly, I reflect on the limitations of my research and the short comings of my research methodologies and suggest ways in which this could be improved. Finally I outline specific topics and aspects of the thesis that have not been covered in the present thesis but are considerably worthy of investigation in the near future.

9.1. Origins

I attempt to clarify the origins of *gyotaku* by investigating the history of the materials such as paper, ink and brushes which are necessary for creating *gyotaku* impressions and by examining the printing process and the ways in which both the materials and methods have developed. This also includes practical experiments to test the suitability of a number of inks and papers commonly used by *gyotaku* practitioners. The *gyotaku* process clearly has similarities to the ancient Chinese art of rubbings which are made from bone, clay, stone, bronzes and other materials with either an intaglio or relief surface. Therefore, it was necessary to determine the history of the materials used in *gyotaku* production and the history and present day use of Chinese rubbing in order to place *gyotaku* in context and possibly reveal more about its origins. These topics are covered in depth in chapters six and seven and to a lesser extent in chapter eight.

There are two main theories regarding the origins of *gyotaku*. Roderick Cave, an expert on nature printing, recently explained his theory in his publication, 'Impressions of Nature, A History of Nature Printing' (2010). Cave suggests that *gyotaku* has its origins in China and explains that his reasoning is due to the fact that the art of Chinese rubbing was already established by the sixth century CE and the long-fibred papers and black ink which are necessary to create a *gyotaku* print also have their origins in China. All of these factors provide the perfect conditions for the development of *gyotaku* in China. A quick search of *gyotaku* on the Internet will provide examples of many practitioners who share Cave's opinion. An earlier theory is related by Yoshio Hiyama in his 1964 American publication, '*Gyotaku*, the Art and Technique of the Japanese Fish Print'. Hiyama explains that he and his colleagues in the group *Gyotaku*-no-kai have found no evidence of *gyotaku*'s origins in China and he states that *gyotaku* developed independently in Japan and was only recently introduced from Japan to China. With regards to China, I believe that due to the current popularity of recreational fishing in China (as outlined in chapter five) and the promotion of the arts and crafts relating to fishing (which includes *gyotaku*) this may provide the impetus for future research about *gyotaku* and new evidence relating to the techniques origins may be discovered in China.

Both of the theories about *gyotaku*'s origins remain speculative as I was unable to prove with any amount of certainty the validity of one theory as opposed to the other. However, there are aspects from both theories which appear plausible to me. I agree with Cave to a certain extent because I am of the opinion that like the majority of Japanese arts and customs *gyotaku* has its roots in the traditions and techniques of China. Many similarities can be found in the practise and materials of Chinese rubbings and *gyotaku*. It is plausible that *gyotaku* was practised in ancient China but became less popular and eventually was forgotten about or abandoned, in a similar fashion to Chinese moveable type. I believe that because *gyotaku* continued to be practised in Japan

over a period of time it developed into something uniquely Japanese. Therefore, I also agree with Hiyama that *gyotaku* (as it exists from the mid 1800's onwards) could possibly have been introduced to China from Japan.

Research by scholars such as Dr. Joseph Needham and his collaborator Professor Tsien Tsuen-Hsuin, well-known experts in the history of China, Kenneth Starr who has researched Chinese rubbings for over half a century and produced the first comprehensive study of Chinese rubbings in English (Starr, 2008), and most recently the findings of Professor Maki Fukuoka who puts forward a new history of Japanese images through an examination of the works of the group called *Shōhyaku-sha* (Fukuoka, 2012) as discussed in chapter three, all suggest that rubbings played an important role in the pictorial practises of Japan. Rubbings were made by the Japanese to record the native flora and fauna of Japan in a scientific manner which included important written notes about particular species as well as providing motifs in art. It is a relatively simple process to press a plant and make an accurate and detailed ink rubbing from it. However, it is quite a different matter when trying to take an impression from a fish. Most fishes' bodies are convex and covered in a layer of mucous, which must first be removed or it will repel the ink. During the process of printing a fish some bodily fluids may leak from the mouth, gills and anus and thus spoil the print. Perhaps this is the reason why the earliest prints were produced as 'trophy prints' in a single colour and that the highly skilled and colourful art form that we know as *gyotaku* today did not develop until the late 1940's and 50's onwards. It is important to note that some of Fukuoka's evidence supporting her theories were not only found in Japanese archives but also in the collection of Leiden University Library. This suggests that a closer examination of the works on paper from the early 1800's, housed in a number of institutions across the world, may be worthy of future research relating to *gyotaku*.

It is assumed that *gyotaku* spread to Japan in the 1950's when Yoshio Hiyama made contact with American scientists and the natural history illustrator Janet Roemhild Canning. However, I discovered that Chiura Obata a Japanese artist who lived in the USA from 1903 onwards may have been responsible for spreading *gyotaku* to the USA. In 1921 he became the co-founder of the East West Art Society in San Francisco and in 1932 he was appointed as an instructor at the Art Department of the University of California in Berkeley, where he taught his students *gyotaku* (Goodwin, 1956, p.440).

9.2. Science

By placing *gyotaku* in the historical context of natural history illustration and relating the techniques to the printing processes and early photo-mechanical processes developed in Europe under the generic term 'Nature Printing' I clarify its relationship with science. It is necessary to place *gyotaku* in the context of the discoveries and technological developments relating to the methods of seeing and rendering images and also the introduction of the taxonomic classification of the natural world. It is also important to acknowledge the contribution that enthusiastic amateurs have played in the advancement of understanding, knowledge and visual images to the field of natural history both in Europe and Japan (this is discussed in greater detail in chapter three).

The two major obstacles to the study of ichthyology are the fact that fishes (and other creatures) natural habitat is water. Species from fresh-water and salt-water rapidly change their colour and many of their markings are lost once they are removed from water. Also, without today's modern technology and equipment for viewing and recording specimens in their natural aquatic habitat it was necessary for early natural historians to kill and preserve their specimens. This allowed them the amount of time necessary to accurately identify the specimen and render its form and perhaps if they had seen them when freshly caught their colours. Unfortunately, the two

common methods of preserving specimens, either in 'spirit collections' such as alcohol, formalin or formaldehyde mixtures and the skin mounted fish of traditional taxidermy do not preserve a specimens colour and often their form is compromised due to shrinkage or either a badly made taxidermy mount on which the skin or flesh is stretched over. This is discussed in greater detail in chapter three using the giant squid as a perfect topical example. I describe the problems of finding a creature that lives in the depths of the oceans and also the methods used for making an accurate record of it which could be used for further scientific study. Researchers such as Dr. Edith Widder, Robert Kunzig, Dr. James B. Wood and natural science illustrator and *gyotaku* artist Steve Thurston all draw attention to the role that technology plays in our ability to not only find creatures in the oceans but also to capture their likeness whether this is with *gyotaku*, photographic still images, digital video or other means of visual imaging. The nature of the aquatic environment presents humans with the very fundamental problems of 'seeing and knowing'.

Hiroshi Aramata in his publication 'Fish of the World: A Collection of 19th Century Paintings' (Aramata, 1990), points to the important differences between Japanese and Western perceptions of fish, in a sense the 'seeing and knowing' of fishes. By using the eel as an example Aramata describes why the Japanese people view the eel as a particularly useful fish while Western people often view the eel with repulsion because of its slimy, snake-like appearance. The perception of fish, primarily viewed as a source of food, has played an important role in this study because of the customs, rituals and religious or spiritual connections that fish have in both Japanese and Western cultures (as discussed in chapter two and three. Furthermore, I believe it is not only the human perception of fish which is formed by genetics and culture (particularly the perception of colour as demonstrated in chapter four) it is also the practical means of viewing the fish or other aquatic creatures and the technical problems encountered with capturing and translating their form,

detail, iridescent colours and markings from a three dimensional specimen to a two dimensional drawing or print, which crosses and connects the fields of art and science.

It is often argued that Japan did not have a tradition of natural history illustration as found in the West. I do not agree with this theory because it is clearly evident that although the method of creating these images differed they were actually produced and are anatomically correct, the species being identifiable. Examples exist which testify to the Japanese skills attained in drawing, painting and observation in the collections of natural history illustrations such as *Kinka Gyofu*. Unlike European illustrations of the time which were generally produced by print technologies, the Japanese illustrations were not restricted in their size. A case in point is the two meter painting of a shark and the one and a half meter painting of a sunfish. Christine E. Jackson in her publication 'Fish in Art' claims that Japanese fish paintings have less concern for correct anatomical or colour details because their emphasis is on the spirit or life in a painting. Although I agree that there is certainly a tendency in Japanese fish illustration to make the fish appear alive (this is because they are a food source and therefore should appear fresh) I do not agree that there is less anatomical or colour detail accuracy. The very fact that a range of paints, micas and varnishes were used in Japanese illustrations and even three dimensional paper models, to capture the vivid and natural colours and iridescent appearance of freshly caught fish and the fact that present day scientific researchers can easily identify the species depicted in these illustrations clearly demonstrates that Japan did indeed have a tradition of natural history illustration. I do not think it is easy to make a comparative study of European and Japanese natural history illustrations and have noted in my research that some scholarly publications have a Euro-centric view point. Japanese and European natural history illustrations each have their own histories and are influenced by cultural perspectives and technology. For example the Japanese works are generally created by drawing and painting and

the European works were generally reproduced by printing technologies, particularly copper-plate engraving which was in some instances hand-coloured.

Clearly, *gyotaku* has a relationship with science and the fact that this method of creating images is still chosen today by scientists such as Professor Mitsuo Fukuchi and Professor Harvey J. Marchant as the preferred illustration method for their publication 'Antarctic Fishes' (illustrated in the *gyotaku* method by Boshu Nagase), testifies not only its relationship with science but also its value as a tool or method for producing accurate and aesthetically pleasing natural history illustrations.

9.3. Art

The third main question of my thesis is the nature of *gyotaku*'s relationship with art. This is discussed in greater detail in chapter four and to some extent in the works of individual *gyotaku* practitioners and some well-known artists who have used variations of the process (whether it was acknowledge as *gyotaku* or not at the time of production). At this point I need to clarify that I am of the opinion that fishing can be classified as an art from. Given that the tradition of *tenkara,* the Japanese art of fly fishing, was practised by *Samurai* as a form of *kata* which developed their minds and bodies and the fact that contemporary fishermen themselves often regard fishing as an art which has to be practised repeatedly and improved upon, (as in the perfection of *kata).* This also highlights the fact that descriptions or classifications of subjects may change over time or be described differently depending upon a person's socio-cultural context. Other people may describe fishing as a sport or a hobby. The collecting, classifying, interpretation and the depicting of nature only emerged as the scientific subject that we know as 'natural history' in the eighteenth century. Before this there was not such a distinction between the arts and science and it can be seen throughout this

thesis that *gyotaku* crosses the boundaries of both subjects and many of the natural history illustrations can be appreciated for their technical abilities and admired as works of art.

In order to verify *gyotaku*'s relationship with art I examined *gyotaku* from its early beginnings as a 'trophy print' made in black *sumi* ink to several examples of *gyotaku* produced by contemporary practitioners. The subject matter and the techniques used in *gyotaku* have become more diverse over time. I believe that I have contributed new knowledge concerning *gyotaku* by examining the works of contemporary practitioners such as Scott Szegeski's surf board *gyotaku* impressions, the 'Hawaiian method' and Olaf Altmann's airbrush application of ink. I examined the significance and meaning of colours in the traditional Japanese arts because polychrome *gyotaku* originated in Japan and was certainly influenced by the traditional aesthetics found in Japanese visual arts such as painting and woodblock prints. Previously, *gyotaku* has not been considered in relation to current research and practises within the field of printmaking so I set out to clarify the status of *gyotaku* in this field. I established the fact that contemporary *gyotaku* practitioners embrace the process as a means of expressing their own particular interests and subjects which hold a personal resonance for them. Modern *gyotaku* works are frequently exhibited in art galleries and works which are made in various *gyotaku* methods are gradually being accepted and selected for curated international print exhibitions. However, there is still little evidence of *gyotaku* in scholarly publications about the visual arts. One example of this is found in the recent publication 'Fish in Art' by Christine E. Jackson (Jackson, 2012) which makes no mention of *gyotaku* and very little in terms of Chinese or Japanese art featuring images of fishes.

Clearly *gyotaku*'s origins and its relationship with art and science are inter-dependent upon the materials and techniques used in its creation. At this stage I have only outlined some of the *gyotaku* practitioners creating works in the most recent *gyotaku* development the 'Hawaiian method' or 'Hawaiian technique'. However, I justify the ways in which this method is different from the

three other *gyotaku* methods. I have also included works by people (in chapter five) who have in my opinion produced impressions using a variation or adaptation of *gyotaku* printing. Traditionally in the direct, indirect, transfer and Hawaiian *gyotaku* the paper or other substrate is placed on top of the specimen. However, many well-known artists such as Salvador Dali, have demonstrated in their work how they place the specimen on top of the substrate. My own *gyotaku* practise was influenced by this and I made a series of 30 direct *gyotaku* prints of octopus, *Octopus vulgaris,* in 2011, entitled 'Then I Saw Dali'. I inked an octopus with culinary sepia and threw it against paper which I had coloured using natural dyes of walnut, pomegranate and onion skins. The prints had a fluid appearance which I had previously found difficult to attain in the traditional direct method of arranging the inked specimen and placing the paper on top.

It is not only the *gyotaku* printing methods which are developing but also the subject matter as I have demonstrated. In my opinion the definition of *gyotaku* does not depend on any particular subject matter or the use of materials but it is defined by the actual printmaking process. I believe it should be clearly identified in a work if the piece was created with a particular method of *gyotaku* or if a particular *gyotaku* method was used in the 'mark making' process which is then translated into another print process. I agree with the opinion of the Japanese *gyotaku* artist Mineo Yamamoto, that *gyotaku* is a process which can be used to print a wide range of subjects. Yamamoto is actively engaged in trying to change the opinion of many people who only associate the word *gyotaku* with 'fish prints'. No other printing process such as; digital printing, 3D printing, lithography, intaglio, relief printing or screen printing is limited to and defined by the subject matter that is printed using any of these particular processes. Why should *gyotaku* merely refer to 'fish prints' when there is evidence that even in the early stages of *gyotaku*'s development other subjects were being printed. Examples of such works are found in the 1964 publication '*Gyotaku* Fish Print' by Yoshio Hiyama which features a flower in a ceramic vase by Hidenosuke Tanaka, zebra fish surrounded by sea

grass and works which feature rocks, bamboo baskets, seaweeds and a range of other aquatic life forms including, squid, oysters, crabs, starfish, and a number of shells. By discussing some of the works made by members of the group *Gyotaku-no-kai*, members of the Nature Printing Society and a number of individuals I have shown that *gyotaku* is a versatile printing process that can be used successfully to print diverse subject matter from natural objects and specimens to the man-made. Also, these *gyotaku* techniques can be adapted to print on a range of substrates.

9.4. Limitations of the Study

In this study I have tried to present an integrated overview of *gyotaku* that includes practitioners and those who have commissioned *gyotaku* prints from various regions of the world. I encompass people from a wide range of disciplines who create diverse *gyotaku* works for diverse reasons. Various definitions of *gyotaku* are identified and developed as well as theories relating to its possible origins. Scholars such as Roderick Cave have not made an in-depth investigation of *gyotaku* because he states that *gyotaku* is worthy of consideration in its own right (Cave, 2010). I agree with Cave because although *gyotaku* can be categorised under the generic umbrella of 'Nature Printing' it is unique. Specifically because of its Far Eastern origins and traditional use of materials which are very different from those used in the European tradition of 'Nature Printing'.

One of the main limitations presented by this study the lack of information from Japanese and Chinese language publications and websites. At the beginning of this research I was aware of the amount of literature concerning *gyotaku* which is available in Japanese and that further information may arise from Chinese literature. Because the majority of this information was inaccessible to me I set out to conduct this study using the information which is available in English. Therefore, it was not possible to produce a clear and accurate time-line of the key Japanese

figures in *gyotaku*'s early history although there is evidence of the members of *Gyotaku-no-kai* and the influential role that they played in the development and spread of *gyotaku*.

Another limitation was the fact that much of the information concerning *gyotaku* is located in either obscure, self-published or out-of-print publications, some of which have no ISBN or catalogue number and have not been included in archives or library collections or made accessible in the form of on-line data bases or on-line libraries. Even large institutions such as the Natural History Museum in the USA, have experienced difficulties in locating their materials concerning *gyotaku*. Therefore, I am indebted and extremely grateful for the wealth of publications which Dr. F.G. (Eric) Hochberg gave to me and for the access he gave me to his personal *gyotaku* collection and the archives of the Nature Printing Society, when I visited America and once I returned home to Portugal.

The sample of *gyotaku* practitioners used in my research was limited to those who have published works, have an on-line presence or whom I have contacted or met personally. There are only a few examples of Japanese practitioners, this is because I was unable to communicate with them easily or the meaning was lost in translation. I realise that to some extent I made certain choices of whose work to include in this study dictated by my own visual preferences. However, I believe that my choices illustrate the theories and concepts featured in this thesis and have given new insight into today's practice of *gyotaku* and the ways in which *gyotaku* relates to the field of printmaking in general. I believe the main implication of this study is that *gyotaku* is a fascinating subject greatly in need of further investigation by researchers that can work collaboratively across disciplines to bring together the existing publications, knowledge and evidence of *gyotaku* written in Japanese and Chinese with the same in English.

9.5. Recommendations for Future Research

Because *gyotaku* printing techniques can be used to print diverse subject matter, as seen in the works of practitioners from the 1950's onwards, it is worthy of further study in terms of both practical and theoretical frameworks. With regards to *gyotaku* and the printing of fish and other creatures one of the main questions is where will our relationship with fish/animals go in the future? Will *gyotaku* become a method of recording the creatures that are under a threat of extinction due to over fishing and climate change? Or will *gyotaku* help to raise awareness of the need for better fisheries and environmental management? Can we justify killing aquatic creatures to create prints with (even if we eat them after a printing session)? There is a changing attitude towards animals in the post-modern era based on a number of economic and cultural changes in society, including animal behaviour studies which reveal creatures emotional and intellectual capabilities and lead us to question how close many animals are to humans. For example it was declared in 2012 by a group of prominent scientists in 'The Cambridge Declaration on Consciousness' that humans are not unique in possessing the neurological substrates that generate consciousness. In fact non-human animals, all mammals, birds and octopuses are 'conscious'. Therefore, a study of *gyotaku* in the contextual framework of animal studies is recommended.

Far from being an obsolete or outdated way of producing images printmaking is important because the process is still at the heart of artistic practice.Various printmaking processes and particularly *gyotaku* provide a hueristic practise in which the practitioners can not only learn about the specimen which they are printing but also about the materials and their interdependent relationship with the *gyotaku* process. In terms of the practical framework of *gyotaku* an in-depth study focusing on the 'Hawaiian method' of *gyotaku*; its history, development and key practitioners in relation to the fishing culture and cuisine of the Hawaiian Islands is valid. *Gyotaku* is a thriving art form in the Hawaiian Islands used for recording the catches of local fishermen and sports fishing

tourists alike. The 'Hawaiian method' of *gyotaku* is a recent development with its own particular aesthetic derived from the dramatic shapes and colours of the regions exotic marine life. Many of the Hawaiian islanders have a great respect for nature and only create *gyotaku* impressions from specimens which will be eaten, an example of such a practitioner is Naoki Hiyashi.

Although I was unable to confirm if some of the octopus and fish images created by the artist Miquel Barcelo were produced using *gyotaku* or a variation of *gyotaku* I believe further exploration of Barcelo's work in the context of this hypothesis is warranted. There is enough information already in existence to indicate and justify further research concerning the *gyotaku* activities and variations of the techniques made by a number of well-known artists works such as; Yves Klein, Salvador Dali, Pierre Alechinsky and Nikolaus Lang and some of the interesting *gyotaku* works or variations of *gyotaku* from contemporary artists who are not so well-known, such as Douglas White. The eclectic nature of the works created by these artists may appear disparate and yet the process of *gyotaku* (or their own variation of the techniques) unites these artists in a framework of a common practice. Hence, a study of *gyotaku* and its future aesthetic directions is worthy in relation to the interpretation of such artists work within the framework of the current theories and discourses in the field of contemporary art and with particular consideration of contemporary printmaking.

Because there is evidence that *gyotaku* techniques are becoming increasingly popular in-depth studies of *gyotaku* based on geographical areas would be of value. For example European *gyotaku*. This may not be possible for each country of the European Union but certainly *gyotaku* is already a popular art form in France and there is evidence that it is gradually becoming more popular in the UK, Spain and Portugal. I became aware of the popularity of *gyotaku* in France and some of its practitioners who reside there during my visit to the *gyotaku* exhibition '*Gyotaku, l'art*

de l'empreinte' held at the fishing museum in Concarneau, France and from Daniel Pardo's excellent publication '*Gyotaku L'âime des Poissons*' (Pardo, 2011).

I believe that further research should be carried out concerning *gyotaku* from the Republic of China. This is because of the similarities found between Chinese rubbing techniques and *gyotaku*, the symbolic significance of fish in Chinese culture and the current popularity of recreational fishing and in certain provinces of China the promotion of traditional fishing methods and the arts and crafts relating to fishing.

My final recommendation is that a detailed and fully illustrated 'step by step' guidebook of how to make *gyotaku* is published in English in full colour including an outline of its possible origins and *gyotaku*'s history plus all four printing methods and examples and variations of these methods.

The Nature Printing Society published an excellent guidebook in 2011 called 'The Art of Printing from Nature' which includes *gyotaku*. However, I believe that *gyotaku* is a subject worthy of an entire publication dedicated to the practise of the art and the methods used in its production. A publication such as this has not been produced since the seminal work by Professor Yoshio Hiyama in 1964, *Gyotaku: The Art and Technique of the Japanese Fish Print.*

10.Bibliography

Adam, R., & Robertson, C. (2010). *Intaglio: the complete safety-first system for creative printmaking: acrylic resist etching, collagraph, engraving, drypoint, mezzotint*. London: Thames & Hudson.

Alcorn Baron, S., Lindquist, E. N., & Shelvin, E. F. (Eds.) (2007). *Agent of change: print culture and studies after Elizabeth L. Eisenstein.* Amherst: University of Massachusetts Press.

Alexeiev, B. M. (1928). *Chinese gods of wealth: A lecture delivered at the School of Oriental Studies, University of London on 26th March 1926.* London: Gt. Britain School of Oriental Studies.

Allen, J. R. S. (2014). *Tenkara fishing ancient and modern.* [Kindle]. Retrieved from http://www.amazon.com

Ambrose, G., & Harris, P. (2010). *The visual dictionary of typography.* Lausanne: AVA Publishing SA.

An, D., & Yang, L. (2008). *Handbook of Chinese mythology.* New York: Oxford University Press.

Anderson, G. (2009). Honouring Dr. F.G. (Eric) Hochberg. *Nature Printing Society Newsletter.* XXXII (2), pp. 1 and 7.

Anderson, G., & Anderson, S. (2008). Certificates of authenticity: sharing *gyotaku* prints with digital reproduction. *Nature Printing Society Newsletter.* XXXI (2), pp. 1 and 4.

Anderson, G., & Anderson, S. (n.d.). Nature printing. Retrieved May 7, 2012, from http://www.marinebio.net/natureprint/index.htm

Anderson, J. D. (2006). *Gyotaku*: crossing the cultures and boundaries. The work of Marcelo Balzaretti and the prints of Mineo Ryuka Yamamoto. *World of Washi Newsletter. 12:3*

Retrieved June 12, 2014, from http://www.hiromipaper.com/newsletter/gyotaku.htm

Anonymous (2000). New Technology Japan: fish print paper. *New Technology Japan.* 29 (1), 18.

Anonymous (2003). I want to be a craftsman. Changes in young people's attitudes to work. Japan Web. [Article]. Retrieved March 19, 2014 from http://www.web.japan.org/trends/lifestyle/lif030902.html

Anonymous (2003). Liquidising goldfish 'not a crime'. Retrieved on June 7, 2013, from http://www.news.bbc.co.uk/go/pr/fr/-2/hi/europe/3040891.stm

Anonymous (2012, January 14). Hawaii News Network. Boy takes strange fish to *gyotaku* artist. Retrieved June 7, 2014 from http://www.hawaiinewsnetwork.com/young-fisherman-takes-strange-fish-to-gyotaku-artist/

Anonymous (2013). The MCBA prize 2013. Artist, Paul Klinger [Statement]. Retrieved May, 27 2014, from http://www.mcbaprize.org/klinger/

Akihito, His Imperial Majesty the Emperor of Japan. (2008) Linné and taxonomy in Japan: On the 300th anniversary of his birth. *The Linnean.* The Linnean Society. (Special issue number 8) 115-121.

Aramata, H. (1990). *Fish of the world: a collection of 19th century paintings*. New York: Portland House, New York.

Armstrong, C., & De Zegher, C. (2004). *Ocean flowers: impressions from nature.* New York: The Drawing Center in association with Princeton University Press.

Art Directors Club. (2009). *Art Directors Annual*. Vol. 87. New York: RotoVision SA.

Art Directors Club. (1954). *33rd Annual of advertising and editorial art and design.*(1st edn.) New York: Farrar Strauss and Young.

Art Gallery of South Australia. (n.d.) Arid Arcadia flinders ranges.[Education pack]. Retrieved from http://www.artgallery.sa.gov.au/agsa/home/Learning/docs/Online_Resources/ED02_Arid_Arcadia_ED_kit.pdf

Asquith, P. J., & Kalland, A. (Eds.) (2004). *Japanese images of nature: cultural perspectives.* London: Routledge Curzon.

Attenborough, D., Alexandratos, R. Clayton, M., & Owens, S. (2007). *Amazing rare things: the art of natural history in the age of discovery.* London: Royal Collection Publications.

AuberJonois, F. (1954). A Japanese fish story. *Scope.* 4(2), 7-12.

Awagami, (n. d.). Awa washi and the Fujimori family. Retrieved January 9, 2014, from http://www.awagami.com/about.html

Bach, R. (2013). *Gyotaku*: Joe Higgins turns fresh-caught fish into art. Retrieved June 30, 2014, from http://gameandfishmag.com/fishing/gyotaku-fish-art-prints/

Baione, T. (2012). *Natural histories: extraordinary rare book selections from the American museum of natural history library*. Ontario: Sterling Signature.

Bagget, P. V., & Shaw, E. L. (2008). The Art and science of *gyotaku*: there's somethin' fishy goin' on here..... science activities: *Classroom Projects and Curriculum Ideas.* 45(1), 3-8.

Baker, S. (2001). *Picturing the beast: animals, identity and representations*. Illinois: Illinois University Press.

Baker, W. H., Folkerts, G. W., & Johnston, C. E. (2008). The Alabama Bass, Micropens henshalli (Teleostei: Centrarchidade) from the Mobile River basin. *Zootaxa*, (1861), 57–67.

Balon, E. K., Bruton, M. N., & Fricke, H. (1988). *Environmental Biology of Fishes*, 23 (4), 241-280. Doi: 10.1007/BF00005238

Barrett, T. (1983). *Japanese papermaking, traditions, tools and techniques.* (1st edn.). New York, Tokyo: John Weatherhill Inc.

Bereznak, A. (2012). Give us Morimoto. Retrieved July 17, 2013, from http://www.vanityfair.com.culture/2012/10/masaharu-morimoto-iron-chef-iphone-food-photos

Berger, J. (1972). *Ways of seeing.* London: British Broadcasting Corporation, London & Penguin Books Ltd.

Berque, A. (1997). *Japan, artifice & Japanese culture,* (translated by Schwarz Ros). Northamptonshire: Pilkington Press.

Bertram, J. (1973). *Brasses and brass rubbing in England.* Newton Abbot: David & Charles Publishers.

Bestor, T. C. (2004). *Tsukiji.* California: University of California Press.

Bloy, C. H. (1972). *History of printmaking balls and rollers, 1440-1850.* Michigan: Wynkyn de Worde Society.

Booth, A. (1991). *Japan.* Hong Kong: The Guidebook Company Ltd.

Braithwaite, V. (2010). *Do fish feel pain?* Oxford: Oxford University Press.

Brett, M. (2007, August 8). First a hook then ink: an artist's catch. *New York Times,* p. 9.

Brickley, J. (2009). Artist Charlie Brown shares *gyotaku* with islanders. Retrieved on June 1, 2014, from http://www.captivasanibel.com/page/content.detail.id/501045/Artist-charlie-Brown-shares-*gyotaku*-with-islanders.html.

Broadbent Casserley, N. (2013). *Washi the art of Japanese paper.* London: Royal Botanic Gardens Kew.

Brokaw, C. J., & Chow, K. (2005). *Printing and book culture in late imperial China.* Berkeley: University of California Press.

Brooks, N. G. & Harris, E. (Eds.) (1989). *The Art of the Nature Print.* [Pamphlet] Available from the Publications Division- BB53, Department of Public Programs, National Museum of American History, Washington DC, 20560

Brown, J. (1978, 17 April). Robert Cale's printmaking studio. *The Compass,* p. 4.

Burns, L. G. (2007). *Tracking trash: flotsam, jetsam and the science of ocean motion*. Boston: Houghton Mifflin Company.

Caligo Inks (n.d.). Research. Retrieved September 27, 2013, from http://www.caligoinks.com/index.php.option=com_content&view=article&id=72&Itemid=48

Cain, E. (Producer) (2001, February 1). Back country discovery route. Episode # 1205. [Television broadcast]. OPB, Oregon Public Broadcasting Service.

Casserley, N. B. (2013). *Washi, the art of Japanese paper.* London: Kew Publishing, Royal Botanic Gardens, Kew, London, UK.

Cave, R. (2010). *Impressions of nature a history of nature printing.* London: The British Library, Mark Batty Publisher.

Cennin, C., & Thompson, D. V. (1954). *The craftsman's handbook: "Il libro dell arte".* New York: Dover Publications.

Chambers, A. (1991). *Suminagashi: the Japanese art of marbling a practical guide*. London: Thames and Hudson.

Chang, M. (Producer) (2008, September 18). The Mona Lisa curse. [Television broadcast].UK, Channel 4.

Charton, B. (2008). *The facts on file dictionary of marine species.* New York: Infobase Publishing, New York.

Clement, E.W. (1911). *The Japanese floral calendar* (2nd rev. edn.) Chicago, USA: The Open Court Publishing Company.

Colston, T. (2010). Real fish rubbing company launches in Lyme Regis. Retrieved on June 2, 2014, from http://www.bizmag.co.uk/News/newsStory.aspx?storyID=604

Conant, E. P., Rimer, J. T., & Owyoung, S. D. (1996). *Nihonga: transcending the past – Japanese style painting, 1868-1968.* New York: Weatherhill, Inc.

Conlan, F. (2005). Searching for the semantic boundaries of the Japanese colour term 'ao'. [Doctoral dissertation]. Edith Cowan University, Australia. Retrieved from http://ro.ecu.edu.au.theses/58

Croft, P. (2001). *Stone lithography.* London: A&C Black Publishers, Ltd.

Cruickshank, K. (1975, 13 April). Printmaker creates art from fish. *Sunday, The Hartford Courant.* pp. 2-4.

Cummings, M. (2013). Researchers discover a new way fish camouflage themselves in the ocean. Retrieved October 27, 2013, from http://www.utexas.edu.news/2013/06/04/researchers-discover-a-new-way-fish-camouflage-themselves-in-the-ocean/

Dahl, C. A. (2002). *Natural impressions: taking an artistic path through nature*. New York: Watson-Guptil.

Dance, S. P., & Swinney, G. N. (1990). *Classic natural history prints, fish.* London: Collins & Brown Limited.

Dard, H. (1978). *Papermaking the history and techniques of an ancient craft.* New York: Dover Publications Inc. New York.

Davidson, A. (2012). *North Atlantic seafood.* Totnes: Prospect Books.

Davidson, M. (1990). Artist shares impressions at trinity. *Trinity Reporter.* 20(4), 4-5.

Davies, R. J., & Ikeno, O. (Eds.) (2002). *The Japanese mind: understanding contemporary Japanese culture.* Boston: Tuttle Publishing.

Da-Wei, K. (1990). *Chinese brushwork in calligraphy and painting: its history and techniques*. New York: Dover Publications Inc., New York.

Dawson, S., & Turner, S. (1995). *A hand papermaker's sourcebook.* London: Estamp London.

DeMello, M. (2013). *Animals and society: an introduction to human-animal studies*. Columbia: Columbia University Press.

Denhoed, P. (2011). The Echizen washi deity and paper festival. *Hand Papermaking.* 26(2), 10-13.

DeRyan, M. (n.d.) *Fish tales and stories.* Alberta: Self-published by author.

Dewees C. M. (2008). About us. Dewees Nature Designs. Retrieved on May 19, 2014, from http://www.deweesnaturedesigns.com/aboutus.html

Dewees C. M. (1984a). *Gyotaku*: catching fish on paper. *Oceans.* Oceanic Society USA. 16 (4), 43

Dewees C. M. (1984b). *The printer's catch: an artist's guide to Pacific coast edible marine animals*. Monterey: Sea Challengers, Incorporated.

Dewees, C. M., Hochberg, E., Geary, I., Little, R.W. (Eds.) (1977a). Foreign news: *Nature Printing Society Newsletter.* (2nd printing) 1 (1), 4.

Dewees, C. M., Hochberg, E., Geary, I., & Little, R. W. (Eds.) (1977b). Guidelines for submission of prints. *Nature Printing Society Newsletter.* (2nd printing) 1 (1), 3

DiCerbo, S. (2012). Mineo Ryuka Yamamoto ambassador of *gyotaku*. *Nature Printing Society Newsletter.* XXXV (4), pp.1 and 6.

Didi-Huberman, G. (2008). *La ressemblance par contact: archéologie, anachronisme et modernité de l'empreinte*. Paris, France: Les Éditions de Minuit.

DiNoto, A., & Winter, D. (1999). *The pressed plant: the art of botanical specimens, nature print and sun pictures.* New York: Stewart, Tabori & Chang, a Division of U.S. Media Holdings Inc. New York.

Driesbach, J.T., & Landauer, S. (1993). *Obata's Yosemite: Art and letters from his trip to the high sierra 1927.* San Francisco: Yosemite Conservancy.

Drumm, R. (2009, 29 September). Making inky use of dead giants. *The East Hampton Star,* p.14.

Duffles, M. (2002, 2 March). The front line: Secrets of human thinking. *Financial Times, p.1.*

Dye, M. (2011). Why Johnny can't name his colors. Retrieved June, 14, 2012 from http://www.scientificamerican.com/article.cmf?id=why-johnny-name-colors/

Dykstra, A. (1987). *The kanji a b c.* Honolulu: Kanji Press.

Earley, L. S. (1983). The art of nature printing. *Wildlife in North Carolina,* 22. doi:ISSN: 0043-549X

Eastaugh, N., Walsh, V., Chaplin, T., & Siddall, R. (2001). *Pigment compendium: a dictionary of historical pigments.* Oxford and Burlington: Elsevier Butterworth-Heinemann.

Eberhard, W. (1986). *A dictionary of Chinese symbols.* New York: Routledge & Kegan Paul.

Eisenstein, E.L. (1979). *The printing press as an agent of change: communications and cultural transformations in Early-modern Europe*. (2 volumes). New York: Cambridge University Press.

Erickson, B. (2001). *The art of Xu Bing: words without meaning, meaning without words.* Washington DC: Freer Gallery of Art & Arthur M. Sackler Gallery Publishers.

Fahr-Becker, G. (2007). *Japanese prints.* Cologne: Taschen GmbH.

Fahr-Becker, G. (2001). *Ryokan: a Japanese tradition.* Cologne: Könemann Verlagsgesellschaft mbH.

Falconer, J., & Hide, L. (2009). *Points of view: capturing the 19th century in photographs.* London: The British Library.

Fang, L. (2011). Fish print competition in China kicks off. Retrieved May 26, 2013, from http://www.english.cntv.cn/program/cultureexpress720110629/104392.shtml

Farber, P. L. (2000). *Finding order in nature: the naturalist tradition from Linnaeus to E.O. Wilson*. Baltimore: The John Hopkins Press.

Fardad, R. (2011). Persian *gyotaku* and the infancy of the art. Retrieved on 14, June, 2014 from http://www.ramine.com/ramine/Fabrique-d-Idee/On-Construit/Gyotakus-persans-et-enfance-de-l-art.html

Farnsworth, D. S. (1997). *A guide to Japanese papermaking: making Japanese paper in the western world*. California: Magnolia Editions.

Feke, J. (1955). How to perform fish printing. *American Artist* 19(8), 8.

Field, A. (1996). *The official catalogue of the graphic works of Salvador Dali*.(1st edn.). Spain: Salvador Dali Archives.

Fisher, F. (n.d.). Aquatic impressions: *gyotaku*. Retrieved May 24, 2013, from http://www.aquatic-impressions.com

Fishing year history Shonai, (n. d.). Retrieved June 12, 2014, from http://www.homepage.2.nifty/com/hekisui/turishi/saikonogyotaku.html

Fitts, D. (1990, 13 April). Robert Cale, lobsterman and artist dies in accident at sea. *The Westerly*

Sun, p.9.

Ford, B. J. (1992). *Images of science.* London: The British Library, London.

Fortner, H. (Director/Producer/Writer). (2008). *Gyotaku the art of the fish print*. [DVD]. Maine: Media Lab.

Fortner, H. (1978). *The limu eaters.* Hawaii: Sea Grant Program.

Fortner, H. (n. d.). About Heather. Retrieved December 13, 2013, from http://www.heatherfortner.com/about-heather-fortner/

Frankel, M. L. (1990). *Gently with the tides: the best of living aboard*. Washington DC: International Marine Publishing.

Frose, R., & Pauly, D. (Eds.) (2000). Fishbase 2000 – concepts, design and datasource. [Database record]. ICLARM (International Center for Living Aquatic Resources Management) currently known as The WorldFish Center, Los Banõs Laguna, Philippines.

Fujino, A., & Skinner, S. (Eds.) (1997) *Kites: paper wings over Japan.* London: Thames & Hudson.

Fukuchi, M., & Marchant, H. J. (2006). *Antarctic fishes: illustrated in the gyotaku method by Boshu Nagase.* New South Wales: Rosenburg Publishing Pty. Ltd. Australia.

Fukuoka, M. (2012). *The Premise of fidelity: science, visuality and representing the real in nineteenth-century Japan*. Stamford: Stamford University Press.

Garfield. S. (2000). *Mauve: how one man invented a colour that changed the world*. London: Faber & Faber Limited.

Garrido, A. (2011). *A epopeia a bacalhau, the cod fish epic.* (Bilingual edn. Portuguese/English) Lisbon, Portugal: Clube do Coleccionador dos Correios.

Geirach, J. (1991). *Where the trout are all as long as your leg.* New York: Simon R. Schuster

Paperbacks.

Gillespie, H. (2012). Eco art and science series. The inked animals of Adam Cohen and Ben Labay. Retrieved on September 24, 2012, from http://www.biocreativity.wrdpress.com2012/05/31/eco-artscience-the-inked-animals-of-adam-cohen-and-ben-labay

Ginsberg, T. (2011). Washi the soul of Japan – fine paper in the second millennium. *Bull & Branch Newsletter of the Friends of Dard Hunter.* 30(3), 8.

Genn, R. (2001, July 18). Re: Fish printing. [Online forum comment]. Retrieved 17 June, 2014, from http://www.clicks.robertgenn.com/html/archive.php?clickback=fish.htm&id=184

Gomori, G. (1952). *Microscopic histochemistry principles and practice.* Chicago: University of Chicago Press.

Goodman, G. K. (2000). *Japan and the Dutch 1600-1853.* Richmond: Curzon Press.

Goodwin, D. (1956). Picture the fish. Journal of the American Museum of Natural History, 65(8), 440- 442

Gordon, A. (2003). *A modern history of Japan: from Tokugawa times to the present*. New York: Oxford University Press.

Graham, G. (2013). Art in the shadows. Retrieved December 21, 2013, from http://www.bdoutdoors.com/article/art-in-the-shadows

Grantham, S. (1997). Painting in Japan. *Conservation Journal V&A*. (24), 22-23.

Greenberg, P. (2010, 24 October). Slither room. *New York Times Sunday Book Review*. p.20.

Griffiths, A. (1980). *Prints and printmaking: an introduction to the history and techniques*. London: British Museum Publications.

Hajek, L. (1989). *Japanese graphic arts.* Leicester: Galley Press an imprint of W H Smith Ltd.

Halverson, A. (2012). Chasing rainbows. *Conservation.* 12(4), 16-21.

Hardage Barret, R. (Ed.) (2013). Emporium. *Country Living.* (UK edn.) July, p.54.

Harris, V. (Ed.). (2001). *Shintō: The sacred art of ancient Japan.* London: The British Museum Press, a division of the British Museum Company Ltd.

Helfman, G., & Collette, B. (2011). *Fishes: the animal answer guide.* Baltimore: The John Hopkins University Press.

Heller, J. (1978). *Paper-making.* New York: Watson-Guptil Publishers.

Herron, C. (1988, 14 January). Group revives ancient craft. *Living North. North Suburban Edition of the Pittsburgh Post Gazette,* pp.10-11.

Hepper, N. F. (1990). *Pharaoh's flowers: the botanical treasures of Tutankhamun*. London: Royal Botanic Gardens Kew.

Hibi, S. (1989). *Japanese detail: traditional architecture, gardens, interiors*. London: Thames & Hudson.

Hibi, S., & Fukuda, K. (2000). *The colours of Japan.* Tokyo, New York, London: Kodansha International Ltd.

Hillier, J. (1985). *Hokusai: paintings, drawings and woodcuts.* (3rd edn.). London: Phaidon.

Hiromi Papers. (2010). *Hiromi Paper Inc. 9th Edition 2010 Catalogue*. [Booklet]. Hiromi Paper Inc.: Author.

Hiyama, Y. (1964a). *Gyotaku the art & technique of the Japanese fish print.* Seattle: University of Washington Press.

Hiyama, Y. (1964b). *Gyotaku fish print: What it is? How to make it?.* Tokyo: University of Tokyo

Press.

Hiyama, Y., Inada, K., Nagata, I., Sato, H., & Shimizu, Y. (1972) *Gyotaku: an art of fish print.* Tokyo: Kodansha.

Hiyama, Y. (1955) *Gyotaku*. *Japan Quarterly*, II(2), 210.

Hochberg, F. G. (Eric). (1985). *Nature printing history & techniques.*[Pamphlet]. Victoria: Museum of Victoria, Australia.

Hochberg, F.G. (2006). In memory of Eizo Doh-ken Kubota (1923-2005). *Nature Printing Society Newsletter.* XXIX (1), 1

Hochberg, F. G. (1981). *The art and technique of nature printing.* [Booklet]. Smithsonian Institution Travelling Exhibition Service.

Hodges, R. S., Buchanan, S., Cody, J., & Nicholson, T. (Eds.) (2003). *The guild handbook of scientific illustration.* (2nd ed.). Hoboken: John Wiley & Sons, Inc.

Holme, B. (1980). *Hiroshige: a shoal of fishes.* New York: Metropolitan Museum of Art & Viking Press, New York.

Hopkin, M. (2005). Giant squid snapped in the deep. Retrieved May 21, 2013 from http://www.nature.com/news/2005/050926/full/news050926-7.html

Hoskins, S. (2004). *Inks.* London: A & C Black Publishers Ltd.

Hubbard, D. (1997). *Neptune's table: cooking the seafood exotics.* Coronado: Sea Eagle Publications.

Hubrig, B. O., & Little, R.W. (1970). *As Oaks from Acorns Sprout*. Mount Pleasant: Laurel Group Press.

Huffman, S. (2012, August 24). The love of teaching. [Blog post]. Retrieved from

http://www.sharronhuffman.com/blog.

Hughes, S. (1978). *Washi the world of Japanese papers.* Tokyo: Kodansha International Ltd.

Hughes, S. (1981). Eric Hochberg's fish heads & other rubbings from nature. *Santa Barbara Magazine.* 7(4), 72-79.

Hunter, D. (1978). *Papermaking the history and technique of an ancient craft*. New York: Dover Publications, New York.

Hussain, M., & Wilkinson, R. (Eds.) (2006). *The pursuit of comparative aesthetics; an interface between east and west.* London: Ashgate Publishing Ltd.

Illinois Gov. News network (2005). Lt. Gov. Pat Quinn promotes fishing in Illinois after world record catfish catch. [Press release]. Retrieved March 23, 2013 from http://www3.illinois.gov/PressRelease/ShowPressRelease.cfm?SubjectID=14&RecNum=4011

Ikegami, K. (1986). *Japanese bookbinding: instructions from a master craftsman.*(1st edn.). Boston: Weatherhill Publishers.

Ivins, W. M. (1953). *Prints and visual communication.* Cambridge: The MIT Press, Cambridge, Massachusetts, USA and London, England, UK.

Jackson, C. E. (2012). *Fish in art.* London: Reaktion Books.

Japan's oldest fish print (c.a.2010). The spirit of fishing, fish print. Retrieved June 2, 2014, from http://www13.plala.or.jp/takuzin./newpage16.index.html

Jmattyb13, (2011 November, 28) *Gyotaku* Annie Sessler-east end fish prints. [Video file]. Retrieved June 2, 2014, from http://www.youtube.com/watch?v=7FJU-jUqcTc

Jobson, J. (2011). *The gyotaku project.* San Francisco: Self-published by author on Blurb print on

demand publications.

Johan, S. (2011, February 6). The year of the rabbit print exhibition. [Blog post]. Retrieved from http://www.yearoftherabbitprintexhibition.blogspot/2011/02rabbit-by-vanessa-cornell-relief.html

John Reeves collection (n.d). Illustrating and classifying. Retrieved March 29, 2013, from http://www.nhm.ac.uk/nature-online/art-nature-imaging/collections/reeves/illustrating-classifying

Kanazawa, H. (1979). *Japanese ink painting*. Tokyo and New York: Kodansha International Inc.

Karstad, A. (1987). Technique of making fish illustration 28 : painting of living specimens. *Environmental Biology of Fishes.* 19(1), 78–79.

Kazuko, E. (2001). *Japanese cooking: the traditions, techniques, ingredients and recipes*. London, UK: Hermes House Publishers.

Kelleher, K. C., & Ishimura, M. T. (2011). *Radically simple, ultralight fly fishing.* Connecticut: Lyons Press, an imprint of Globe Pequot Press.

Kemp, M. (2006). *Seen/unseen: art, science and intuition from Leonardo to the Hubble telescope*. Oxford: Oxford University Press.

Kennedy, A. (1990). *Japanese costume: history and tradition.* (1st edn.). Paris: Editions Adam Biro.

Kent, N. (Executive Producer) (2008, Sept. 20). *The Mona Lisa Curse.* [Television Broadcast] London, UK: Channel 4.

Kent, S. (1994). *Shark infested waters.* London: Zwemmer, London.

Kerr, A. (2001). *Dogs and demons the fall of modern Japan*. London: Penguin Books.

Keyes, R. S. (2006). *Ehon: the artist and the book in Japan.* New York: New York Public Library.

Kiyofusa, N. (1954). *Japanese paper-making.* (1st edn.). Tokyo: Hokuseido Press.

Klein, H. (Director) (2003). *Modern art a complete guide.* [DVD] London: Quantum Leap.

Klein, Y., McEvilley, T., Restany, P., & Rosenthal, N. (1982). *Yves Klein 1928-1962: a retrospective.* Houston: Houston Texas Institute for the Arts, Rice University.

Klyn, B. (n.d.). World trout initiative. Retrieved June 12, 2013 from http://www.patagonia.com/ca/patagonia.go?assetid=49154

Knox, S. (1956, 21 June). Japan's *gyotaku* process takes imprints of fish for posterity. *The New York Times.* p.31.

Kodani Hill, K. (2000). *Topaz moon: Chiura Obata's art of the internment*. Berkeley: Heyday Books.

Kornick, P. F. (2000). *The book in Japan: a cultural history from the beginnings to the nineteenth century*. Hawaii: University of Hawaii Press.

Kouwenhoven, A., & Forrer, M. (2000). *Siebold and Japan: his life and work.* Amsterdam: KIT Publishers.

Kroon, J. (2007, April 8). Embossing fish skins. [Blog post]. Retrieved from http://www.jon-erikkroon.blogspot/2007/04/embossing-fish-skins.html

Kunzig, R. (2000). *Mapping the deep.* London: Sort of Books.

Kurlansky, M. (2001). *The cod's tale.* New York: G.P. Putman's Sons a division of Penguin Books for Young Readers.

Kyoko, I. (2007). Washi into the twenty-first Century. *Hand Papermaking.* 22 (1), 11-14

Laden, P. (Ed.). (1997). *Chemistry and technology of water based inks.* (1st edn.) London, UK: Chapman and Hall.

Lang, N., & Radford, R. (1988). *Nikolaus Lang: Australian imaginary figurations 1986-1988.* Adelaide: Art Gallery of South Australia.

Lang, N. (2001). *Roadkill; material pictures in collaboration with Dorie Gibson, Andrew Gibson & John Turpie*. Adelaide: Light Square Gallery, AIT, Arts.

Larsen, S. (Ed.) (2011). *The art of printing from nature, a guidebook from the Nature Printing Society*. USA: NPS.

Lawrence, F. L. (1983). Marine education in Virginia. *Special marine education issue, marine resource bulletin.* XV (2), 2-3.

Lawrence, M. J. (Ed.) (2007). *Sea urchin: biology and ecology*. Waltham and California: Academic Press.

Leach, R., & Pierce, R. (Eds.) (1994). *Printing ink manual* (5th edn.). Dordrecht, Boston, London: Kluwer Academic Publishers.

Little, R. W. (1976). *Nature printing.* Pittsburgh: Self-published, printed by Pickwick-Morcraft, Inc., Pittsburgh, USA.

Little, R. W. (1985). *Creative concepts in nature printing.* Pittsburgh: Self-published, Printed by Hoechstetter Printing Company, USA.

Lippit, Y. (1980). *Colorful realm: Japanese bird-and-flower paintings by Itō Jakuchū*. Chicago: University of Chicago Press.

Livingstone, M. (2008). *Vision and art: the biology of seeing.* New York: Abrams of Harry N. Abrams, Inc.

Lo, C. (2004). Gyotaku artists. HanaHou the magazine of Hawaiian Airlines. 7(5), 4.

Lowe, J. (1983). *Japanese crafts*. London: John Murray Publishers Ltd.

Love, M. S., Yoklavich, M., & Thorsteinson, L. (2002). *The rockfishes of the Northeast Pacific*. Berkeley: University of California Press.

Macintyre. M. (1981). *The shogun inheritance: Japan and the legacy of the samurai.* London: William Collins Sons and Co. Ltd. and the British Broadcasting Corporation.

Magee, J. (2009). *Art of nature: three centuries of natural history art from around the world*. London: The Natural History Museum London.

Magee, J. (2011). *Images of nature: Chinese art and the Reeves collection.* London: The Natural History Museum London.

Makeham, J., Buell, P., Campbell, D., de Crespingny, R., Demattè, P., & Farmer, E. L. (Ed.) (2008). *China: the world's oldest living civilisation revealed.* London: Thames & Hudson.

Martin, R., & Thurstan, M. (2009). *Natural history painting with the Eden project.* London: Batsford.

Mason, N. (n.d.) Getting creative with the Cornish catch. Retrieved on August 8, 2013, from http://www.landlove.com/article.php?id=72&ptitle=getting-creative-with-the-cornish-catch

Matranga, V. (Ed.) (2005). *Echinodermata. Series: progress in molecular and subcellular biology subseries: marine molecular biotechnology*. 39. Berlin and Heidelberg: Springer.

McAllister, D. E. (1985). Technique of making fish illustration 14: prints of carbon dust originals. *Environmental Biology of Fishes*, 144(4), 280.

McAllister, D. E. (1986). Technique of making fish illustration 16: *gyotaku*, direct prints from fish specimens. *Environmental Biology of Fishes*, 15 (2), 90.

McAuliffe J. (n.d) About the Artist, Retrieved on 17 May 2014 from http://www.zengyotaku.com/about_the_atist_.html.

Meder, J. (1978). Translated and revised by Ames, W. *The mastery of drawing.* Connecticut: Abaris Books.

Meredith, J. (1989). Pike. [Print]. Retrieved October 23, 2012 from http://collections.vam.ac.uk/item/O141936/pike-print-meredith-julian/

Mirviss. J. B., & Carpenter, J. T. (1995). *The Frank Lloyd Wright collection of surimono.* New York & Arizona: Weatherhill Inc & Phoenix Art Museum.

Mitchell, F., & Fulton, K. (Producers) (2013, April, 17). *Nature: The mystery of eels.* [Television broadcast]. PBS Public Broadcasting Service, USA.

Monoyios, K. (2011). Ichthyology meets printmaking. [Blog post] In Scientific American Blogs. Retrieved on Dec. 28, 2013, from http://blogs.scientificamerican.com/symbiartic/2011/12/20/ichthyology-meets-printmaking

Moyle, P. B. (1993). *Fish: an enthusiast's guide.* Berkeley: University of California Press.

Müsch, I., Rust, J., & Willman, R. (2011). *Albertus Seba: cabinet of natural curiosities.* Cologne: Taschen GmbH.

Mullet, F. (2011). Spritzing. In Fred Mullet. Retrieved April 24, 2012 from http://www.fredmullet.com/mullet/index.htm

Nagata, I. (1960). *Gyotaku.* Tokyo: Geibi Shuppansha.

Nan, W. J., Xiaoli, C., & Young, D. (1997). *The complete oriental painting course.* London: Aurum Press Ltd.

Narita, K. (1954). *A life of Tsai Lung and Japanese paper-making.* California: Hokuseido Press, an imprint of P.D. & Ione Perkins.

Nasco, (2013). Nasco early learning, Nasco life/form®. [Catalogue]. Nasco: Author.

Nelson, J. S. (2006). *Fishes of the world.* (4th edn.) New Jersey: John Wiley & Sons.

Needham, J., & Tsuen-Hsuin, T. (1985). *Science & civilisation in China. Vol. 1.* Cambridge: University Press Cambridge.

Nikkhah, R., & Henry, J. (2009). Fish killed in conceptual artist's exhibition at Tate Modern. [Electronic version]. Telegraph, UK. Retrieved December 13, 2011, from http://www.telegraph.co.uk/culture/art/4622284

Nobel, C. D. (2001). Interview with artist Chloe Dee Nobel, conducted by Esther Stewart for "eternal journal", August 11, 2001. Retrieved April 25, 2014 from, http://www.nobelsculpture.org/-HR-color-gray-font-color-gray/Interview-with-Chloe-Dee-Nobel

Nowell, L. (2008). Beyond visualization. Retrieved November 24, 2013 from http://www.vis.cs.ucdavis.edu/Ultravis08/slides/BeyandVisualization_Nowell_SC08.v2.pdf

O'Brien, M. (April, 2004). Mid Atlantic fly fishing guide. *Mid Atlantic Fly Fishing Guide.* 14 (3), 1-3.

O'Connor, C. (2013). Very fishy art. Retrieved December 23, 2013, from, http://www.midweek.com/home/naoki-hayashi/

OECD (2002). OECD Environmental Performance Review. Japan: OECD Publishing. DOI: 10. 1787 / 9789264175334-en

Ogborn, M. (2007). *Indian ink: script and print in the making of the English East India Company*. Chicago: University of Chicago Press.

Okamoto, N. (1997). *Japanese ink painting: the art of sumi-e.* New York: Sterling Publishers.

Olander, D. (1994). *Gyotaku fish impressions the art of Japanese fish printing*. Portland: Frank

Amato Publications.

Olander, D. (2012, April 25). Rigs to reefs. [Blog post]. Retrieved from http://www.guyharveysportswear.com/blog/page4

Oliveira, M. T. (Ed.) (2011). *Oceanário de Lisboa: ilustração dos oceanos.* (1st edn. Bilingual Portuguese/English) Lisbon: Oceanário de Lisboa and Editorial Bizâncio, Lda.

Ono, M. (2011). *The simple art of Japanese papercrafts.* London: Cico Books an Imprint of Ryland Peters & Small Ltd.

Ota, Y. (1998). *Basil Hall Chamberlain: Portrait of a Japanologist.* Meiji Japan series 4, book 4. London: Routledge

Pardo, D. (2011). *Gyotaku l'âmes des poissons.* Concarneau: Musée de la Pêche de Concarneau & Coop Breizh, France.

Parker, W. E. (1991). *Roger L. Crossgrove three decades, works on paper and photographs.* [Pamphlet].Connecticut: The William Bento Museum of Art, University of Connecticut.

Patton, T. C. (1979). *Paint flow and pigment dispersion: a rheological approach to coating and ink technology.* Hoboken: Wiley Blackwell.

Pearsall, J. (Ed.) (2002). *Concise Oxford English Dictionary* (10th rev. edn.). Oxford: Oxford University Press.

Peluso. A. (2012). *Saltwater flies of the southeast and gulf coast.* Portland: Frank Amato Publications, Inc.

Peyton, D. (2013). Dan Peyton photography and cut paper imagery. About. Retrieved November14, 2013, from http://www.danpeyton.com/#!about

Pietsch, T. W. (2010). *Tropical fishes of the East Indies.* Cologne: Taschen GmbH.

Prosek, J. (2010). *Eels: an exploration, from New Zealand to the Sargasso of the world's most extraordinary fish*. New York: Harper.

Prosek, J. (1997). Joe and me: an education in fishing and friendship. New York: Rob Weisbach Books.

Prosek, J. (2012). *Ocean fishes: paintings of saltwater fish*. New York: Rizzoli.

Rabal, V. (2011). *Gyotaku: capturar l'anima dels peixos*. [Limited edition artists book, 300 edn.]. Barcelona, Self-published by author.

Raffles, H. (2011). *Insectopedia* (rpt edn.) New York: Vintage Books, a division of Random House, New York.

Rath, E. (2010). *Food and fantasy in modern Japan.* Berkeley: University of California Press.

Ray, S. (n.d.). *Cornish fish rubbing pictures – gyotaku.* Retrieved on April 7, 2011, from http://www.thepadstowmusselco.com/fish-rubbing-prints.html

Reichenbach, E. (2007). My teacher Boshu Nagase. *Nature Printing Society Newsletter.* Vol. XXX, (4), 7.

Remmington, R., & Fripp, R. (2007). *Design and science: the life and work of Will Burtin.* London: Lund Humphries.

Richie, D. (1992). *A taste of Japan: food fact and fable, what the people eat, customs and etiquette*. Tokyo: Kodansha International.

Rimer, J. T. (1998). *A readers guide to Japanese literature.* New York: Kodansha International.

Roberts, A. (2009). *A story beyond every picture. Wellcome image awards.* [Pamphlet]. London: Wellcome Trust.

Roman, A. (2009, January 16). Lessedra update. [Blog post]. Retrieved from

http://www.burnishingsblogspot.com/2009/01/lessedra-update.html

Roper, C., & Ocean Portal Team (2013). Giant squid. Retrieved June 24, 2012, from http://www.ocean.si.edu/giant-squid

Ross, J., Romano, C., & Ross, T. (1990). *The complete printmaker: techniques, traditions, innovations.* (rev. edn.). New York, USA: The Free Press a division of Simon & Schuster Ltd.

Ross, M. E. (2000). *Nature art with Chiura Obata*. Minneapolis: Carolhoda Books.

Rousmaniere, N. (Ed.) (2007). *Crafting beauty in modern Japan: fifty years of the Japan traditional art and crafts exhibition.* London: The British Museum Press.

Rudin, B. (1992). *Making paper: a look into the history of an ancient craft*. Connecticut: Lyons Press.

Ruitenbeek, K. (2002). *Chinese shadows: stone reliefs, rubbings and related works of art from the Han Dynasty*. Ontario: Royal Ontario Museum Canada.

SAIAB (2013, April 18). Creativity comes from within: *gyotaku* and haiku. [Blog post]. Retrieved from http://www.aquazone.saiab.blogspot.pt/2013_04_01_archive.html

Salter, R. (2001). *Japanese woodblock printing.* London: A & C Black Publishers Ltd.

Sans, J., & Xiaoyan, G. (2010). *Qiu Zhijie: breaking the ice, a history.* (Bilingual edn. Chinese/English). Hong Kong: Timezone 8.

Santa Barbara Museum of Natural History (2012). 40 years of science, research, and art dedicated to better guiding the destiny of the world. [Press release]. Retrieved on June 15, 2014 from http:www.independent.com/news/2012/apr/27/40-years-science-research-and-art-dedicated-better/?print

Sariz, N. (2012). *Gyotaku* capturar el alma de los peces. *Eikyô influencias Japonesas.* 5 Spring 14-15.

Schneider, A., & Wright, C. (2010). *Contemporary art and anthropology*. Oxford: Berg Publishers.

Schrope, M. (January, 14, 2013). Giant squid filmed in its natural environment. Nature News. Retrieved, June 2, 2014, from http.//www.nature.com/news/giant-squid-filmed-in-its-natural-environment.1.12202 Doi: 10.1038/nature.2013.12202

Schuster, P. K. (1999). *Das XX Jahrhundert. Ein Jahrhundert Kunst in Deutschland*. Berlin: Nicolaische Verlagsbuchhandlung.

Schweid, R. (2009). *Eels.* London: Reaktion Books.

Screech, T. (2012). *Obtaining images: art production and display in Edo Japan*. London: Reaktion Books.

Screech, T. (2002). *The lens without the heart: the western scientific gaze and popular imagery in later Edo Japan*. (2nd edn.). Richmond: Curzon Press.

Shimizu, M. (1998). Mourning the death of Dr. Yoshio Hiyama. *Journal of Radiation Research.* Retrieved on June 14, 2011, from http.//www.jrr.oxfordjournals.org/content/29/3/local/back-matter.pdf

Shimizu, Y. (1956, January 1). *Gyotaku fish printing*. [Radio broadcast]. International Broadcasting Department Nihon Hōsō Kyokai, Japan.

Shimuzu, Y. (1971). *Gyotaku no bi.* Kyoto: Shoin, Japan.

Siegesmund, R. (1973). Faculty show: Bob Cale at A. A. C. gallery. *The Trinity Tripod.* LXX1 (22), *5.*

Singer, B. (n. d.). Home. *Gyotaku* art. Retrieved on February 21, 2014, from

http://www.gyotakuartist.com

Simons, C. (1981). Behold the ones that didn't get away. *Smithsonian* 12(3), 151-153.

Smith, L. (1985). *Contemporary Japanese prints: symbols of a society in transition*. London: British Museum Publications Ltd.

Smith, L., & Schatt, C. (1996). *House of cod.* [Limited edition artist book, edn. of 50]. Phoenix: Picnic Press.

Spanek, D. (n.d.). *Gyotaku* fish platters. Spanek enterprises. Retrieved July 7, 2014, from http://spanek.com/roaster/gyotaku.php.

Spies, W. (1986). *Max Ernst frottages.* (rev. edn.). London: Thames & Hudson.

Squid in ink. (n.d.) Art and nature imaging. Retrieved April 24, 2012, from http://www.nhm.ac.uk/nature-online/art-nature-imaging/art-techniques/squid-in-ink/

Starr, K. (2008). *Black Tigers a grammar of Chinese rubbings.* Seattle: University of Washington Press.

Stave, P., & Zucker, M. (2008). *Propagating Eden: uses and techniques of nature printing*. [Brochure]. New York: Wave Hill and the International Print Center New York (IPCNY).

Stephens, A. R. (1993). *The new-wave 20th century prints from the Robert O. Muller collection*. London: Bamboo Publishing Ltd.

Steuber, J. (2007). *The art of China: 3000 years of art and literature*. London: Scriptum Editions.

Stokes, N. C. (2001). The fin art of science. *The Science Teacher.* March issue. 23-24

Straits, H. K., & Salvesen, B. (2002). *The broad spectrum: studies in the materials and techniques, and conservation of colour on paper*. London: Archetype publications.

Sutera, C. (2011, July 18). Educational uses of *gyotaku* fish printing. [Blog post]. Retrieved from

http://www.ocean.si.edu.blog/educational-uses-gyotaku-or-fish-printing

Szegeski, S. (2013, June 2). Surfboard *gyotaku*. [Blog post]. Retrieved from http://www.outeastmontauk.blogspot.com

Takuhon, (n. d.). What is takuhon? Retrieved April 4, 2012, from http://www.takuhon.com

Taniguchi, K. (2009). Information: cultural fish print of Japan the world of Taniguchi Koujin *gyotaku*. Retrieved April, 19, 2014 from http://www.khojin.jp/eb.html

Tanizaki, J. (2001). *In praise of shadows.* London: Vintage, Random House Group Limited.

The truth about 'scientific' whaling (n.d.). Our work. [Statement]. Retrieved March 23, 2013, from http://www.ifaw.org/united-states-our-work-whales/truth-about-'scientifc'-whaling

Thurston, S. (2010). Home. Retrieved June 9, 2013, from http://www.fishprintsite.com

Tilson, J. (2011). *In at the deep end.* London: Quadrille Publishing Limited.

Turnbull, S. R. (1986). *The book of the samurai: the warrior class of Japan*. Leicester: Magna Books.

Turner, S. (1989). *A printmakers handbook.* London: Estamp London.

Turner, S. (1991). *Which ? Paper: a review of fine papers for artists craftspeople and designers*. London: Estamp London.

Turner, S. (1994). *About prints: A guide for artist printmakers*. London: Estamp London.

Upensky, M. (1996). *Hiroshige: a hundred views of Edo.* London: Siroco, London.

USPTO (May 17, 1979). Fushimi Co., Ltd., United States of America Patent Office.

Vande Walle, W. F., & Kasaya, K. (2001). *Dondonaeus in Japan: translation and the scientific mind in the Tokugawa period.* Leuven, Belgium: Leuven University Press.

Varichon, A. (2006). *Colours: what they are and how to make them.* New York: Abrams, an imprint of Harry N. Abrams.

Wainwright, S. H. (1935). *Beauty in Japan.* New York: G. P. Putnam's Sons.

Webber, P. (1995). The Parkes collection of Japanese paper. *Conservation Journal V&A.* April 1995, issue 15. Retrieved February 19, 2014, from http://www.vam.co.uk/content/journals/conservation-journal/issue-15/the-parkes-collection-of-japanese-paper/

Wheeler, A. (1987). Peter Artedi, founder of modern ichthyology. 3-10 Retrieved September 7, 2011, from http://www.artedi.nrm/se/fishbase_se/artedi.wheeler.pdf

Whetstone, D. (2009, August, 22). Artist's volunteers are having a whale of a time. The Journal. Retrieved May 28, 2014 from http://www.thejournal.co.uk/culture/arts/artists-volunteers-having-whale-time-4476059

Witherington, B. (2006). *Sea turtles.* Grantown-on-Spey: Colin Baxter Photography Ltd.

Williams, C. A. S. (1974). *Chinese symbolism and art motifs.* (3rd. edn.) Boston: Charles E. Tuttle Co. an imprint of Peri Plus Editions Hong Kong.

Williams, W. (2011). *Kraken: the curious exciting and slightly disturbing science of squid*. New York: Abrams.

Withey, D. (2010). School of fish: Japan's art of *gyotaku*, Deborah Withey artist. Retrieved May 28, 2014 from http://www.artpembrokeshire.co.uk/u/publication/Article_EARLY_SUMMER_10.pdf

Wood, J. B. (2001). Cephalopod species: *Ssepioteuthis sepioidea*, Caribbean reef squid. Retrieved on March 3, 2014, from http://www.thecephalopodpage.org/Ssepioidea.php

Wood, J. B., Bryne, R. A., & Monks, N. (2003). Coleoid cephalopods through time and cyberspace;

using cephbase to examine behaviour and selection. *Berliner Geowissenschaftliche Anhandlungen*. 3: 261-266.

Wookey Hole. (n.d.). Wookey Hole paper mill: making paper. Retrieved on March 17, 2014, from http://www.wookey.co.uk/hand-made-paper-mill/

Xi, J. S. (2012). *Writing brush, ink stick, paper and ink slab.* (Bilingual edn. Chinese/English). Anhui Province: Huangshan Publishing House.

Xinhau, & Xu Yu, (2010, November 25). Wooden moveable-type printing maintained in Rui'an, China's Zhejiang. Retrieved June 15, 2014, from http://www.english.sina.com/life/p/2010/1124/349545.html

Yang, X. (2010). *Tracing the past drawing the future: master ink painters in twentieth century China.* Milan: 5 Continents Editions.

Yamamoto, M. (2012, May, 23). Creating life from death, a lecture presented at the Beaty Museum on July 28 2011 [Video file]. Retrieved June 12, 2013, from http://www.youtube.com/watch?v=D1bhNI7hssM

Yamamoto, M. (n.d.). *Gyotaku* gallery. Retrieved on July 10, 2014 from http://www2a.biglobe.ne.jp

Yibin, N. (2009). *Symbols art and language from the land of the dragon: the cultural history of 100 Chinese characters.* London: Duncan Baird Publishers.

Yingying, Y., & Lui, J. (trans.) (2014). Little carp jumps over the dragon gate. Beijing: China Intercontinental Press.

Zeifer, E. (1972). The Marine Prints of Bob Cale. *American Artist Magazine.* 36(360), 56-68

Zuckerman, W. (2010). New scientist. Giant squid get radical plastic surgery. Retrieved on June 7, 2014 from http://www.newscientist.com/article/dn18619-giant-squid-get-radicalplasticsurgery.html#.Uo5iQNL