Section: RESEARCH IN ACTION

FIFTY YEARS OF ICHTHYOLOGY IN GRAHAMSTOWN

By P.H. Skelton

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In July 1946, the fledgling Council for Scientific and Industrial Research (CSIR) awarded Dr J.L.B. (James Leonard Brierley) Smith of Rhodes University College a research fellowship of £800 to enable him to devote his energies to ichthyology. The university responded by providing accommodation, equipment and appointing Smith a research professor. These actions marked the beginning of what has become a major academic development in Grahamstown as represented by the J.L.B. Smith Institute of Ichthyology, the Department of Ichthyology and Fisheries Science (DIFS), and the Freshwater Fish Section at the Albany Museum. At present more than 40 people are employed in one way or other in these organizations, more than 20 of them professionals, in addition to whom there are 41 postgraduate students currently studying ichthyology or fisheries science through DIFS at Rhodes University. Altogether this represents a concentration of ichthyological expertise probably unmatched anywhere else in the world. It is opportune therefore to highlight a few of the more significant milestones in the history of ichthyology in Grahamstown and so illuminate some of the key factors behind this achievement.

Professor J.L.B. Smith

As one of South Africa's best known scientists,(1) and a household name in his day, Professor J.L.B. Smith is probably best remembered for his role in the discovery and description of the coelacanth(2) and for his passionate pursuit of a second coelacanth specimen) An inorganic chemist by training and profession, Smith was born in Graaff-Reinet in 1897, and received his PhD at the University of Cambridge in 1922. He was an outstanding, award-winning scholar, and also a fine sportsman in his youth. He was a keen angler who was passionately curious about the identity and relationships of the fishes he encountered, a hobby that eventually became his full-time occupation. In the 1920s, he started visiting the Albany Museum to indulge his interest in the identity of fishes he caught or observed on the sea-shore. He published his first ichthyological paper in 1931(4) and before long became known as an expert on the marine fishes of South Africa. His involvement in the discovery, identification and description of the living coelacanth(3) was one of the key events that decided his professional fate. Another was his marriage to Margaret Mary Macdonald, one of his chemistry students, in 1936.

During the Second World War, Smith continued teaching and research in chemistry and ichthyology, but in 1941 a fire in the Albany Museums was another event that, ironically, helped to secure the future of ichthyology in Grahamstown. The fire forced the evacuation of the fish collection, for which Rhodes University provided accommodation. The impoverished museum was not able to re-house the collection at the time, and so it was a matter of practicality and destiny that, in 1946, the CSIR and the university combined to provide the means necessary for Smith to devote his energies full-time to ichthyology.

Just before the CSIR awarded Smith the research fellowship a group of interested persons that was raising money for a book on South African marine fishes approached him to write the work.(1) He agreed to do this and assembled a team to gather material for the book and mounted an expedition to Portuguese East Africa (now Mozambique). During the expedition many specimens were collected and Smith established contact with the Portuguese authorities, something that greatly facilitated much of his future work in that area. The book, The Sea Fishes of Southern Africa,(6) was published in 1949 and the full print-run of 5000 copies sold out in three weeks! The fifth edition was published in 1965 so that, in retrospect, the Sea Fishes project was the foundation on which Smith's main ichthyological contributions rested. He produced 445 popular articles, seven books (some of which ran to multiple editions) and 186 scientific papers between 1946 and 1968,(1) all of which ensured his high public profile, and that of ichthyology in Grahamstown, over those years.

Smith's name is synonymous with the coelacanth, not only because of his role in the description of the first specimen discovered in 1938, but also because of the success, in 1952, of his quest to locate a second specimen. In Old Fourlegs, his popular book on the quest, he vividly described the drama and excitement of the search for the second coelacanth) The work was a best-seller around the world, and further established his credentials in both the scientific and public eye. Having discovered the Comoros Islands as the home of the coelacanth, and boldly retrieved the specimen, Smith withdrew from further coelacanth research in the light of political pitfalls that could arise due to the French control of the islands. South African interest in the coelacanth was later revived on the 50th anniversary of the discovery of the species in 1988.(7)

In spite of his interest and proven ability to teach, Smith declined to divert his attention to teaching ichthyology, and opened the doors of his department to only two other resident researchers. These were Rex Jubb, a freshwater fish systematist who worked in the department from 1957 to 1961, and Dr Peter Castle, an eel expert who came on an Anglo American Corporation fellowship(1) from 1965 to 1969.

J.L.B. Smith died by his own hand in January 1968. His widow, Margaret Mary Smith, acted decisively to ensure the continuation of ichthyology in the Department. By the end of the year Rhodes University and the CSIR had joined forces to create the J.L.B. Smith Institute of Ichthyology and appointed Margaret Smith as the first director.

Margaret Mary Smith OMS

Margaret Smith was a major force behind the success of her husband. She was not only his loyal and supportive wife, but also his scientific assistant and artist for most of his works. The Smiths went on numerous fish collecting expeditions, during which Margaret became an accomplished ichthyologist in her own right. She took to illustrating fishes in colour and black and white, especially for the later editions of Sea Fishes of Southern Africa but also for Fishes of the Seychelles(10) and Fishes of the Tsitsikama Coastal National Park.(11)

Under Margaret's energetic guidance, the institute grew rapidly in the early 1970s. An American ichthyologist, Dr Thomas Fraser, joined the staff as senior lecturer in 1970 and the first postgraduate student (P.H. Skelton) enrolled in 1973. A freshwater research fellow, Peter Jackson, was appointed in the same year. Fraser returned to the United States at the end of 1973 and was replaced by Dr Richard Winterbottom, son of the well-

known ornithologist, Professor J. Winterbottom of the University of Cape Town. Dr Winterbottom moved to the Royal Ontario Museum, Toronto, at the end of 1976, but in his short stay he planted the seeds of what has become an extremely productive school of ichthyology. Dr Michael Bruton replaced him as senior lecturer in 1978.

Peter Jackson focused his attention on aquaculture and fisheries science, mainly through a project funded by the Fisheries Development Corporation that investigated the fisheries and aquaculture potential of South African eels. He also became involved in the CSIR's Lake le Roux project that, in part, examined the fisheries potential of that man-made water body on the Orange River.(12) These were fundamental steps towards establishing fisheries science at Rhodes. Jackson also initiated local interest in the cichlid fishes of Lake Malawi which, in 1978, resulted in Dr Tony Ribbink leading a major seven-year research programme on the lake's ichthyofauna. Ribbink's initial programme has extended into one of the most successfullong-term research initiatives of the institute that, in part, has reported on the aquarium potential of the fishes, helped establish the Lake Malawi National Park and has been instrumental in providing training to numerous students and officials. At present Dr Ribbink is serving as the manager of the Lake Malawi Biodiversity Conservation Programme, funded by the World Bank, that will run for several years and involves scientists from many countries in and beyond Africa.

In 1975, the J.L.B. Smith Institute moved into a new custom-designed building which was officially opened on 26 September 1977, the birth date of both Margaret and J.L.B. Smith. The building was financed through the university and placed considerable strain on its limited research funding resources. Consequently, Margaret Smith and the vice-chancellor of Rhodes University and chairman of the institute's council, Dr Derek Henderson, negotiated with the government for the institute to be proclaimed as a declared cultural institution financed by the then Department of National Education in 1981.(8) Mike Bruton was appointed acting head of the new Department of Ichthyology and Fisheries Science that was then established to continue with the teaching and training of ichthyologists.

Margaret Smith initiated a major project to revise the Sea Fishes book in 1978, that culminated in the publication of Smiths' Sea Fishes(13) in 1986. A marine systematist, Dr Phillip Heemstra, was recruited to assist with the project that drew on the combined expertise of 75 ichthyologists from 15 countries.(14) That there was the need for this major revision of the earlier book is evident by comparing the number of species covered in the last impression of Sea Fishes of Southern Africa (1325) and the number now included in Smiths' Sea Fishes (2200). In its own way this series of books has been the backbone of marine systematic ichthyology in Grahamstown these past 50 years. Ongoing since 1946, marine fish systematics has resulted in numerous taxonomic revisions, many of which have been published through the department's or the institute's in-house bulletins, special publications or in international journals.

Margaret was always an extremely dynamic woman who contributed inestimably in establishing the J.L.B. Smith Institute and promoting ichthyology in Grahamstown, and indeed internationally. Rhodes University honoured her as professor emeritus on her retirement and conferred on her an honorary doctorate of laws in 1987. Shortly before her death in 1987, she was awarded South Africa's highest civilian honour, the Order for Meritorious Service, Class I: Gold.

1981-1996

Mike Bruton succeeded Margaret Smith as director in 1982, was appointed a professor of the university, and continued also to serve as acting head of the DIFS until Dr Thomas Hecht was appointed as the new senior lecturer and (in 1983) professor and head of department.(14) The institute and DIFS have continued along parallel paths of development since that time.

Systematics, both marine and freshwater, has continued to thrive and forms the foundation research activity in the institute. Heemstra co-edited Smiths' Sea Fishes and has continued to update that volume into its third impression in 1995. He has also produced a major volume on the serranid fishes (groupers) of the world(15) and is currently preparing an account of the fishes of the western Indian Ocean. In 1984, a project on the fishes of the Southern Ocean was initiated by Mike Bruton that led to the publication of the institute's second major marine fish book, Fishes of the Southern Ocean, in 1990.(16) Dr Leonard Compagno visited Grahamstown in 1983 and joined the institute a year later to work on cartilaginous fishes. During his tenure he published a number of scientific papers and books and began a campaign to promote the conservation of sharks, especially the great white shark. In 1989, Compagno left to join the South African Museum in Cape Town, where he continues to direct the Shark Research Centre. Dr Eric Anderson, an expert on mid- and deepwater fishes, succeeded Compagno and has ushered in a whole new research field of expertise for the institute. Anderson has also begun to research South African ichthyo-palaeontology, a much neglected field from the local perspective.

In 1982, Bruton initiated a major ecological programme on the Okavango system in Botswana that included an assessment of the fisheries and ultimately an investigation of the tsetse fly spraying programme, funded by the World Wide Fund for Nature. The programme was conducted in collaboration with Dr Glenn Merron, who joined from the University of Michigan in 1983 as a student and left in 1995 as an accomplished African floodplain fisheries expert. Merron also carried out extensive research investigations on the Phongola floodplain in Maputaland during this time.

Professor Bruton's own research interests were broad and extended from classical autecological studies on the Mozambique tilapia(n17) and sharptooth catfisht(18,19,20) to the biology of alien invasive organisms and alternative life-history styles of animals. In 1987 he was the prime mover behind a successful international symposium on `Alternative life-history styles of fishes and other animals'.(21,22) The 50th anniversary of the discovery of the coelacanth sparked also his interest in the biology, ecology and conservation of this extraordinary fish and he organized several expeditions to the Comoros, which resulted in a major book(23) and spearheaded the efforts to conserve the fish through the formation of a Coelacanth Conservation Council.(8,23,24) A spinoff of this refocus on the coelacanth was the research visit to South Africa by the German research submersible Jago, an event that captured the imagination of the public and provided first-time video footage of South African east coast marine offshore habitats beyond the SCUBA range? Btuton left the institute at the end of 1994 to take up a new post of director, educational and scientific services at the Two Oceans Aquarium at the Waterfront, Cape Town.

A move to include estuarine expertise in the institute's research repertoire was taken in 1987 with the appointment of Dr Alan Whitfield as a senior research scientist. Much of

his recent work has addressed the structure and functioning of ichthyofaunal assemblages in South African estuaries, with particular emphasis on juvenile fish recruitment and the maintenance of nursery areas within Eastern Cape systems. In 1992 he formed the Estuarine Research Group within the institute, which has led to an expansion in the range of estuarine studies being conducted along the southeast coast.

Freshwater ichthyology in Grahamstown Began tentatively in the 1930s, when Smith's fishy interests were channelled through the Albany Museum and he touched briefly on freshwater fishes.(26,27) Rex Jubb's brief tenure in the Department of Ichthyology at Rhodes in the late 1950s was an attempt to balance the needs of freshwater ichthyology against the overriding focus on marine fish systematics. On leaving the department in 1961, Jubb continued his research as a CSIR research fellow at the Albany Museum, where he established an excellent freshwater fish collection that persists to the present time.(5) A comprehensive book(28) crowned Jubb's tremendous contributions to the study of southern African freshwater fishes, and in 1971 he was granted an honorary doctorate by Rhodes University. The Albany Museum created the post of curator of fishes to manage the collection and conduct systematic research. The first incumbent was Frank Farquharson, who remained from 1961 to 1970 and was succeeded in 1972 by Paul Skelton. Skelton worked closely with Jubb on freshwater fish systematics and in 1984 moved to the J.L.B. Smith Institute of Ichthyology, where he became the curator of freshwater fishes. The publication of a comprehensive guide to the freshwater fishes in southern Africa(29) marked another milestone in this field of endeavour. Fish systematics in Grahamstown was boosted by the effervescent presence of Dr Humphry Greenwood FRS, who settled here after his retirement from the British Museum of Natural History in 1987. Humphry's untimely death in March 1995 was a big loss to the community as a whole. Freshwater fish research at the Albany Museum is currently in the hands of Dr Jim Cambray, an early life-history specialist, ecologist and conservationist.

No account of ichthyology in Grahamstown would be complete without the mention of the great support given to the scientists by the artists, and others, over the years. From the outset, J.L.B. Smith recognized the vital need for accurate colour illustrations of fishes in systematic accounts. He took a team of artists with him on his first expedition to Mocambique in 1946 but soon this task was taken up by his wife, Margaret. She alone did 685 illustrations for the first Sea Fishes book. Later, Margaret taught Rex Jubb's wife, Hilda, to illustrate fishes and the high quality of illustrations from both these supportive wives is a hallmark of their husbands' work. Thus both for marine and freshwater ichthyology in Grahamstown, a founding husband-scientist and wife-artist partnership existed. The tradition is now being extended through Phil Heemstra and his wife, Elaine. Other high quality artists serving the institute are Dave Voorvelt and, in the 1970s and 1980s, Elizabeth Tart.

Department of Ichthyology and Fisheries Science, Rhodes University

Research in the Department of Ichthyology and Fisheries Science has focused on the applied aspects of fish biology and ecology, fisheries and aquaculture. In the 1970s, work on aquaculture began with an investigation of the culture of eels by Martin Davies, during which the first steps towards developing an experimental fish farm were taken. With the initiation of a new CSIR research programme on aquaculture,(31) Professor Hecht skilfully adapted aquaculture research at Rhodes University to the changing needs of the local industry. Initially, the aquaculture research focused on aspects of catfish culture including breeding, rearing and nutrition. He pioneered the use of Clarias x

Heterobranchus hybrids in aquaculture.(32) The department's experimental fish farm was opened in 1984 and has been used as a research and teaching tool. More recently, major inroads have been made into abalone culture by Dr Peter Britz, marine fish culture and the culture of aquarium fishes.

Hecht also drove the department into marine fisheries research. In 1984, together with one of his Ph.D. students, Robin Tilney, he established a marine fisheries laboratory in Port Alfred. The first project undertaken at the laboratory focused on the commercial line fishery of the area. Since then marine fisheries research in the department has grown by leaps and bounds and has spread to studies on the management of fisheries at Tristan da Cunha in the South Atlantic and studies on the management of by-catch species on the Agulhas Bank.

Dr Charles Hocutt from the University of Maryland joined DIFS in late 1982 and during his short stay of two years contributed greatly towards the teaching of ichthyology. On his return to the USA, Hocutt's post was taken by a doyen of African Great Lake fisheries scientists, Dr George Coulter. During his term from 1984 to 1986, Coulter worked on a major treatise on Lake Tanganyika.(33)

Dr (later Professor) Colin Buxton joined DIFS in 1987 and concentrated on the ecology, biology and management of marine reef and linefishes. Much of his research was done in the Tsitsikamma National Park and he became a leading international expert on marine reserves and marine conservation before emigrating to Australia in January 1996. He has been replaced by Dr Warwick Sauer, who joined DIFS in July 1996 from the Sea Fisheries Research Institute (SFRI). Since the early 1980s, DIFS has fostered close ties with the SFRI and the fishing industry.

Education and training

Since 1982 there has been a tremendous growth in the teaching of ichthyology and fisheries science through DIFS. There are now three teaching staff and 41 postgraduate students are currently registered. Staff of the J.L.B. Smith Institute also supervise students and give courses in ichthyology in the department. The number of degrees conferred on graduates to date is impressive -- 76 BSc (honours), 47 MSc and 18 PhD degrees. An annual average of 12 postgraduate degrees has been awarded over the past five years and in April 1996 nine honours degrees, six master's and four doctorates in ichthyology and fisheries science were conferred.

Future outlook

Personalities and timing have both been key factors behind the success of ichthyology in Grahamstown these last 50 years. J.L.B. Smith and Margaret Smith were both determined, inspiring and dynamic individuals driven towards clearly defined but ambitious goals. The Smiths attracted a host of similarly motivated and dedicated individuals such as professors Bruton and Hecht in their wake. The endeavours of these dynamic people have been well supported by the university, the Foundation for Research Development and many other individuals and corporate bodies.

The timing of critical or key events has also been crucial to the success of the science -- for example, the establishment of the CSIR in 1946 coincided with the desire of individuals for a book on the marine fishes of southern Africa and the availability of J.L.B. Smith to undertake the project. Political constraints during the past 25 years have undoubtedly complicated research development in South Africa, for instance, in terms of

international collaboration and investment, but at the same time these obstacles have encouraged greater resourcefulness and self-reliance by individuals and institutions.

Having reached the 50th-year mile stone, what is the future of ichthyology and fisheries science in Grahamstown? `The future is not what it used to be' would seem to be part of the answer to this question. Aquaculture and fisheries are important job-creating and revenue-earning industries with positive and enduring prospects in Africa, but what of the more traditional scientific pursuits of systematic ichthyology, and ecology, stalwart activities of the past 50 years? There is no doubt that basic marine and freshwater systematic ichthyology is still desperately needed in Africa. Indeed, the continent is facing massive environmental degradation and lacks the expertise and information needed to address the biodiversity crisis. There are signs that western largesse is declining and increasingly Africa will have to depend on its own financial and human resources for its needs. There is therefore a pressing need for resident centres of expertise and training such as that found in Grahamstown.

Whilst it would seem that traditional sources of funds in the natural sciences in South Africa (in particular the public sector) may decline in the face of the national focus on establishing social and economic equity, there is also the realization that alternative funding sources have opened up in the wake of international political acceptance of the new order. Opportunities for research are increasing but, paradoxically, the freedom to choose one's research is a declining factor for individuals and organizations. Applied aspects of the government's Reconstruction and Development Programme are increasingly dictating the availability of funds and research relevance. Problems arising from resource depletion, ecological transformation and degradation of the environment as a result of development and the ever-rising human population requires multidisciplinary scientific and technological input for effective solutions. Ichthyologists and fisheries scientists are specialists who must become team participants with other groups or organizations in research programmes.

The need for the full range of ichthyology and fisheries science to be taught and practised in Grahamstown therefore persists in the applied world of the new South Africa. The challenge is to ensure that participants are drawn from the full spectrum of society and continue to be high calibre, dynamic individuals who are prepared to work hard for relevant goals. If these ideals can be achieved, and there is no reason why they should not be, then there is no doubt as to the next 50 years of ichthyology and fisheries science in Grahamstown.

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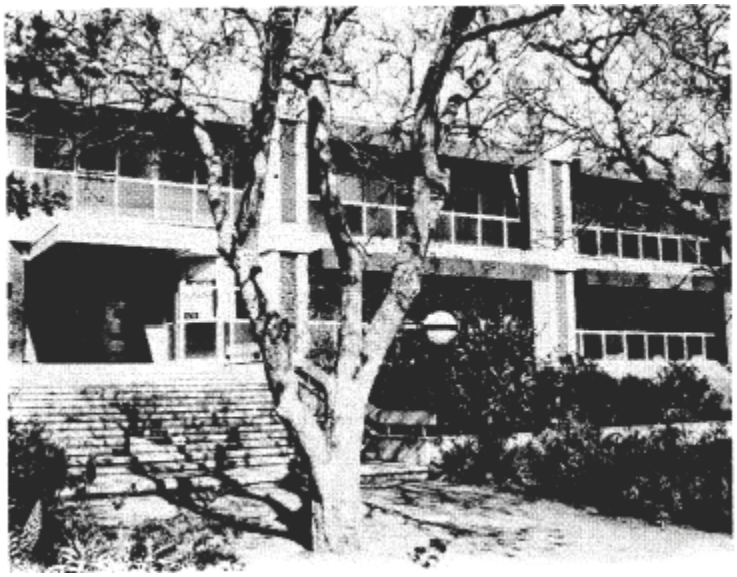
Professor J.L.B. Smith, with his wife and assistant Margaret Smith, examining a stonefish in the collection room of the original Department of Ichthyology at Rhodes University (date unknown).



The custom-designed building of the J.L.B. Smith Institute of Ichthyology in Somerset Street, Grahamstown.

Hexatrygon bickelli Heemstra & Smith 1980. The first specimen of the six-gill ray was found on the beach in Port Elizabeth by Dave Bickell. This species, representing also a new genus and new family, is one of the most significant fishes discovered and described by ichthyologists in Grahamstown during the past 50 years.