A STUDY OF VARIATION

IN THE

SHELL OF THE MARINE GASTROPOD,

PURPURA LAPILLUS.

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A THESIS

PRESENTED TO THE FACULTY OF THE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

FOR THE DEGREE OF BACHELOR OF SCIENCE,

MAY, 1900.

55844

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INTRODUCTION

The phenomena of variation form the basis of fact upon which must rest any theory of organic evolution. It is only by the study of individual variation that we are able to measure the force of heredity, and the study of racial variation is equally necessary for the precise determination of the limits of species.

While the importance of the subject was recognized by Lamarck, Darwin, Wallace and their followers many years ago, it was not until 18 that J. G. Allen introduced the quantitative method of precise measurements into the study of variation, and not till 18 that Galton first employed the statistical method in the discussion of the results, and it is only within a very few years that Allen and Galton have found any considerable number of followers. Leunis estimates the total number of living species as 272,090, while the number in which the variations have been studied quantitatively probably does not exceed 50, and the number of workers may be counted upon the two hands.

The application of the principles of precise measurements and statistical methods to the study of variation in organic species has opened a new field of biological research,-- one which is almost untrodden and may be expected to yield results of the greatest general importance. But before any great generalizations can be made with safety, the laws of variation must

be determined in many species, in many different localities, and by many independent workers. Therefore, any contribution to the subject, no matter how small, if the work be done accurately and well, will be of importance as a contribution to the final result.

A particularly favorable subject for a study of this kind is to be found in one of the small marine snails, Purpura lapillus, (L.), Lam., that is found on both the east and west coasts of North America and is common everywhere on the coast of New England from Eastport to Cape Cod. The most casual observer looking at these shells as they cluster in the tide pools or cling to the Fucus cannot fail to be struck by the variety that they present in coloration, sculpturing and shape of shell. Moreover, if one should gather some of the snails for the purpose of determining the name of the species by reference to published descriptions, he would find himself at once involved in difficulties, for this mollusc belongs to a group in which the limits of the species are particularly hard to define.

In Purpura lapillus, then, we have a form that is abundant, that presents well-marked and easily measured variations, and that suggests numerous questions that we can hope to answer only by the statistical method. Surely one could not wish for more favorable material.

A discussion of the questions that we may expect to answer is better deferred until after a review of the work of others upon similar lines. Before taking that up, let us see what Purpura lapillus is. The best published description of the species

is given by Leunis ('83) as follows:- "The shell is ovoid, pointed, ribbed, greenish yellow, often banded with white; spire conical; lip thick, slightly folded on its inner surface; length 35 m.m." According to Tryon, the male Purpura lapillus is longer and more slender than the female, and has a fine, tapering spire, with a plicated throat. In aged specimens, the throat has not infrequently a succession of tubercular rows, forming internal varices. Occasionally a shell is truncated, or the first whorls broken and deserted. In brackish water they are smaller and thinner.

This thoroughly inexact method of description is far from what it ought to be, and illustrates the urgent need for an entire change in systematic methods.

THEORETICAL.

The species we are considering varies widely in many characters or respects. In passing, it may be said that it would be hard to find a more variable group of organisms. It has baffled conchologists to such an extent that the classification of the species of the Purpurae is hopelessly unscientific. But throughout the great variations in form, size and markings, the shell retains an individuality of its own which distinguishes it from closely related species, so that there is at work besides the centrifugal or dissipating force of variation, the centripetal or centralizing force of heredity. The latter gives to the type the individuality which distinguishes it from others, while the former gives the plasticity which allows it to be adaptive. Both heredity and variation are absolutely indispensible factors in the continuance of a species and should never be regarded as antagonistic to each other except in the sense that each modifies the other by its presence.

Variation thus assumes an importance in the study of organisms which is equalled only by heredity. The appreciation of this fact has been felt only recently, but already, as a result of investigation of the phenomenon of biological variation, several laws of great importance have been discovered, and it looks as if we had here a key by means of which we can unlock many of the problems of biology. No one method can ever claim to solve the problem of Life, and much that is claimed for this method is

absurd, but that it is a real tool when put into hands capable of using it cannot truthfully be denied. As Weldon has pointed out, one of its richest fields is in answering some of the objections to natural selection, and in a consequent strengthening of that doctrine. Its value in the classification of doubtful species has been greatly overestimated, but it certainly can be of some value there also.

A great deal of work has already been done in measuring characters of different groups of animals and plants, to determine the laws governing variation. It has been shown by these researches that, given a representative lot from a single species, the characters of individuals will group themselves about the mean in such a way that the further one recedes from the average, the fewer individuals will be found, and conversely, the nearer one approaches the average, the greater number will be found. Weldon ('90) first conclusively showed what Galton ( ) and Quetelet ( ) had partly proven, that " The variations in size of the organs measured occur with the frequency indicated by the law of error." Added proof of this law (called also the law of probability or more accurately the law of probability of error) may be found in the data of nearly every piece of subsequent work on variation, and it has now become well established. This law states that the individuals group themselves symmetrically about the average, that small departures from the average are more frequent than large ones, and that there is a limit in each direction beyond which no individuals will occur. Biological variation, then, has been found

to be expressed by this law. Merriman ('97) remarks, "Nature aims to produce certain mean proportions; and the various groups into which (living things) may be classified deviate from the mean according to the law of the probability curve."

The establishment of this fact served as a foundation for further research which has been carried on along several independent lines. The most fruitful of these thus far has been in investigating the working of natural selection. Weldon ('95) actually determined the rate at which natural selection was working among a group of crabs in Plymouth, England. He pointed out in the paper that only by getting a quantitative measure of this factor can we appreciate its importance. "The whole difficulty of the theory of natural selection is a quantitative difficulty. It is the difficulty of believing that in any given case a small deviation from the mean character will be sufficiently useful or sufficiently harmful to matter. That is a difficulty which can only be got rid of by determining in a number of cases how much a given variation does matter; and I hope I have shown you that such determination is possible, and if it is possible, it is our duty to make it..... For numerical knowledge of this kind is the only ultimate test of the theory of natural selection or of any other theory of any natural process whatever." This at once puts the matter in the right light, and its forcefulness cannot be gainsaid.

Experimenting on the cause of variation, Vernon ('97) found that changes in environment appreciably affected the material (sea-urchins) upon which he worked.

The effect of a new environment on a species was investigated by Bumpus ('97) on the introduced sparrow and in ('98) on the marine gastropod Littorina littorea. Both forms were found to be more variable in the new environment.

These are, perhaps, the most striking pieces of work done in this line, and do not fairly represent the average. A vast amount of work of a more elementary and less striking character has been done in the way of locating species or varieties in their proper numerical place. While such work may not possess great value of itself, it must be regarded as a distinct contribution to the subject. The present work is of this type. It attempts to locate the species Purpura lapillus from a number of aspects, and to note any truths which come out as result of this process of cataloguing.

In collecting the shells to study the variations which occurred, I realized that to have the measurements of any value, I must collect with three points in view:-

1) To determine what variations are due to geographical position,

2) To determine what variations are due to differences in kind of localities, and

3) To determine what degree of continuity or discontinuity the species shows.

The first point was fulfilled by making collections in localities as widely separated as possible:-at Eastport, Me., Kennebunk Beach, Me., Gloucester, Mass., and Newport, R. I. ; the second, by making two collections at Eastport,-one in smooth,

the other in rough water, and by noting carefully the character of the other collecting points; the third, by getting shells from the southern limit of the species, and from as far north as possible, and by getting as much variety in the environment as I could. A description of the various collecting points will be found at the beginning of each set of data. Collection was performed methodically at random, that is, so as to avoid selection with respect to any character. In localities where (all but Gloucester) the shells were not too numerous, I picked the rocks clean, i. e. took all there were within a certain area. The shells were boiled as soon as possible after gathering,-- in order to facilitate the removal of the animals,-- and were then kept in alcohol (90%) until wanted for use.

The first separation of the shells was made according to sex, in order that variations due to this factor might be taken into account. The determination of sex is comparatively easy since the external genital organs are dissimilar in the two sexes, and all that is necessary is to pull out the muscular region with a tenaculum and note the presence or absence of the penis. As regards errors resulting from not being able to distinguish sex in immature specimens, there are practically none. I have found the external reproductive organs present and differenciated from a very early stage. Doubtful cases, i. e. maimed specimens, were in all cases discarded, as well as empty shells.

GENERAL DESCRIPTION OF THE SPECIES.

ANATOMY.--- Purpura lapillus is a prosobranchiate gastropod of the family Muricidae*. The animal, (figured on Plate 1, Fig. 3,) like the typical gastropod, is spirally coiled, an arrangement which is carried out in the twisted shell in which it lives (figured on Plate 1, Figs. 1 & 2). The body may be roughly divided into three regions according to the general character of each. The first is the muscular, which comprises the head and foot; the splanchnic, which includes most of the viscera; and the hepatic, which consists of the convoluted organ known as the liver.

In the muscular region, the tentacles before mentioned, the mouth and external genital organs, the anus and excretory opening occur. From the fact that this region bears all the organs which connect direct directly with the external environment, it is the only one which ordinarily protrudes from the shell.

The splanchnic region contains, among other structures, the reproductive organs. The difference in the size of these in the two sexes is important as it has its bearing on the shape of the shell. Where in the male we have the testis situated at the second whorl (usually) embracing the "liver" with its racemose branches, we find in the female the more or less globose ovary

* Order, Prosobranchiata; Sub-order, Monotocardia; Section, Rachiglossa; Family, Muricidae; Sub-family, Purpurinae.
Rev. A. H. Cooke, Cambridge Natural History (Molluscs) 1895.

pushing aside the "liver" and occupying much more room than the testis. From the ovary, the much convoluted oviducts lead to the uterus, a sac-like organ capable of holding a number of the egg-capsules, each containing many embryos. In contrast to this, will appear the arrangement in the male. From the sperm-gland, or testis before mentioned, simple ducts, vasa efferentia and vasa deferentia lead to the penis which is situated exteriorly and lies in the mantle-cavity. The internal genital organs of the male are far less bulky then, than are those of the female. The organs, more especially the female organs do,not mature until the animal has attained considerable size,-about the time when the third whorl of the shell is formed. In the male, however, the penis seems to be present from an early period.

The third or hepatic region occupies in the adult shell the first and second whorls. It consists, as before stated, of an organ which has been called the liver, but which is physiologically more important to the organism than a simple liver would be. In regard to this point, researches carried on by Biedermann and Moritz show that the molluscan liver contains three kinds of cells,--(a) secretory cells, whose secretion digests starch and cellulose in the stomach, (b) absorptive cells, and (c) lime cells. The two last accumulate stores of glycogen, fat, and perhaps some albuminoid substance. The lime cells have principally to do with the storage of fat and calcium phosphate. The fresh secretion has no appreciable digestive effect on albuminoids. There is no absorption in the intestine, which is

lined with ciliated and glandular epithelium; its fluid contents pass into the recesses of the "liver" and back again. Thus the organ in question performs the functions, not only of the liver, but also those of the stomach and pancreas; besides being a reservoir for fat and of material for the shell. It is present from a very early stage, and it is around this structure that the first rudiments of a shell appear. Thus it has special significance in determining the shape and further growth of the first and second whorls of the shell, which are generally called nuclear whorls, in distinction from later whorls, known as adult whorls.

DISTRIBUTION.--- The species is distributed from Greenland to Long Island Sound on the Atlantic Coast of North America, while nearly related species occur on the Pacific Coast, and on the shores of France and England. None is found in the Mediterranean.

STATION.--- Purpura occurs between high and low water mark, nearer the latter than the former, on rocks bearing rock-weed. It occurs either in fissures and crevices or clinging to the smooth roof of a cave-like recess among boulders. It may occur singly or in clumps, with other marine forms or alone.

LIFE HISTORY AND DEVELOPMENT.--- The molluscan ovum has a colored yolk, is surrounded by albumen and enclosed by a membrane. The cleavage nucleus lies in the centre of the egg, and complete, unequal cleavage of the ovum occurs. The still nearly spherical embryo forms a pre-oral ring of cilia which is pushed forward and outward to form two ciliated wing-like expansions

known as the vela. In the veliger stage, the velum serves as an organ of locomotion. It causes the rotation of the larva within the egg-capsules, and, after hatching, furnishes a means of locomotion from place to place. A veliger is shown in Fig. 3, Plate 1. The posterior part of the body is covered by a cap-like shell which encloses only the "liver" and yolk cells. This shell forms the nucleus about which additions are made. The mantle, which develops at this point, is the active agent in the formation of new shell. This grows down over the body from the dorsal region of the body-wall, secreting the new shell as it grows. The spiral character of the shell appears with the first secretory activity of the mantle. During this period or shortly after, the embryo is hatched from the capsule, and leads a free-swimming existence in the sea. The foot gradually replaces the velum as an organ of locomotion, and the mollusc attaches itself to the rocks, while the shell continues to grow.

THE SHELL.--- The shell of Purpura lapillus grows by addition of lime salts to the lower or apertural end. As the mantle, which lies about the muscular region, is instrumental in this process, anything affecting the mantle will in all probability affect also the shell. If the vital activity of the secretory surface is increased because of a prosperous condition of the organism, it follows that the shell will increase in size and grow faster than it otherwise would, and if the organism becomes impoverished, the shell will stop growing, or will grow but slowly. In other words, there is a close relationship between the shell and the organism.

An inspection of a number of shells shows that some grow at varying rates while others grow more steadily. Unequal rates of growth produce distortion of the axis of the shell, which is easily distinguished from the straight axis of the shell growing steadily. Some shells grow faster than others, a fact which causes variation in the angle of growth. When shells stop growing as a result of unfavorable conditions, there is a tendency for the shell to thicken at the aperture. When the conditions favoring growth return, the thick aperture is absorbed and secretion commences anew. The remains of the aperture are usually to be seen as longitudinal ridges on the outside of the shell, and are called lines of growth.

ITS RELATIONS TO THE SOFT PARTS.--- The animal, so to speak, builds additions to its house as it from time to time can afford, and makes few alterations, so that not only the present status but also the past history of the creature is indelibly stamped on its habitation. In this connection Kefferstein remarks, "The shell supplies us with the best means of knowing the animal..... Having learned the close relationship which exists between shell and animal, we find therein ample justification for attaching especial importance to the shell in a systematic point of view." The shell, moreover, is a structure easily measured, and its permanency of form is a great factor.

From this evidence it follows that, in a study which attempts to deal with phylogenetic and ontogenetic problems, variations from the normal can be studied best by observing the shell, which, although it is lifeless material, has been moulded

by and represents the peculiarities of the living, for the shell can be measured accurately, while the soft parts cannot. Without immediately stating what problems are to be solved in a study of this sort, it will be profitable to treat briefly of the variations which occur in the shape, size, thickness and markings of the shell.

VARIATIONS IN THE SHAPE.--- The shape of the shell varies within limits wide enough to be readily observed even by the untrained eye. In general, the shape is rhomboidal, and varies from long rhomboidal to rhombic. The long rhomboidal shell is shown in Fig. 1, Plate 5, and is markedly different from the rhombic shell shown in Fig. 1, Plate 6.

VARIATIONS IN SIZE.--- In every community, we may find if we like, individuals varying in size from the newly born to the giant. But in organisms which, like Purpura, pass through a free-swimming larval existence, and become adherent to the rocks when they have attained some size, it is evident that a collection from rocks will not show the true range in size. The effect of environment on size is taken up on Page

VARIATION IN THICKNESS.--- The shells vary considerably in thickness, some being as thick as heavy window-glass, others being as thin as an egg-shell. Taken all in all, thickness seems so important a character that it should be measured in work of this sort.

VARIATION IN MARKINGS OF THE SHELL.--- The shells are sculptured in three distinct ways,-- by imbrications, by sutures and by ribs. Imbrications are raised, longitudinal flutings oc-

curing at intervals on the shell. They represent the lines of growth of a shell possessing a fluted outer lip. A shell of this sort is figured on Plate 3, Figs. 16 to 18. Some shells present no imbrications, some show a few, and some are profusely imbricated. The imbrications can be compared to a piece of corrugated tin roofing. A sutured shell is one whose whorls are distinctly marked off from one another by a more or less deep channel or groove. This is figured on Plate 3, Figs. 19 to 21. Shells may be not sutured, or they may be distinctly sutured. Purpura lapillus is never markedly sutured, but since other species of Purpura show marked sutures, this character should not be overlooked. Ribbed shells are those in which there are markings having the form of ridges running parallel to the sutures. These are seen on Plate 3, Figs. 22 to 24. Purpura may be conspicuously ribbed, obsoletely ribbed or not ribbed.

VARIATIONS IN COLOR.--- The color of the shells varies from pure white, through pink to red and through yellow to brown. Banded shells are to be found, the arrangement usually being a double band on a lighter ground. A further description of the color of Purpura will be found on Pages 29 and 30.

PLATE I.

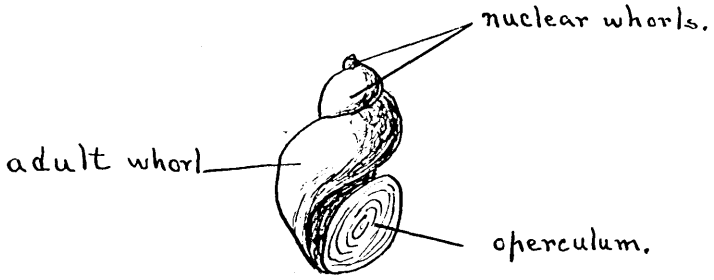


Fig. 1.

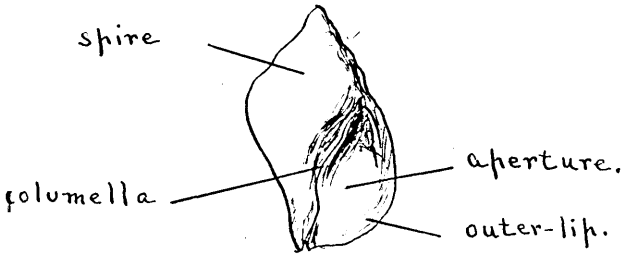


Fig. 2.

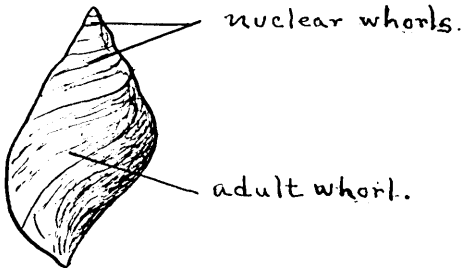


Fig 3.

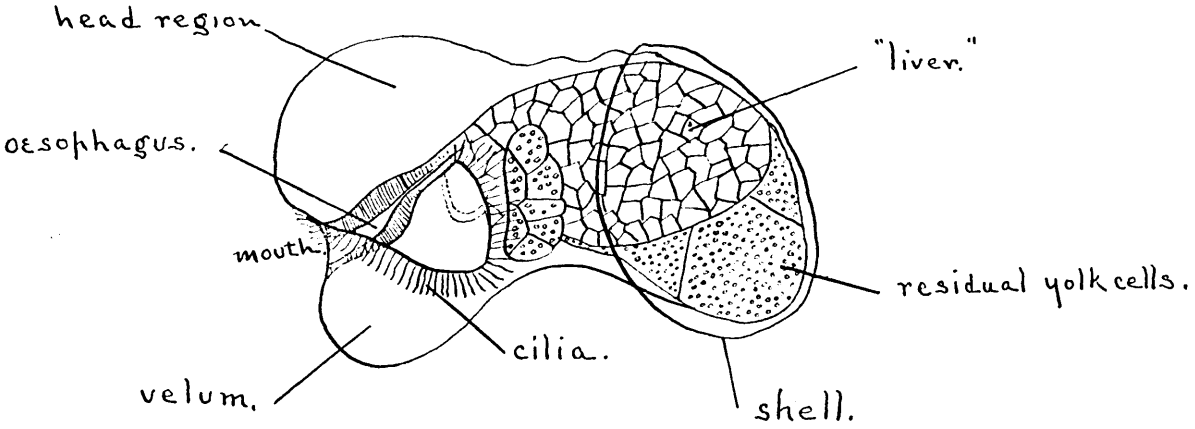


Fig. 4.

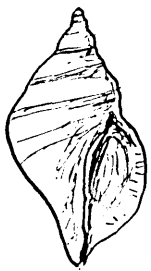


Fig. 5.

Fig 6.

STATISTICAL.

CHARACTERS MEASURED.--- Of the measurable characters of the shell, the following ones have been chosen as being the most valuable and likely to contain among them the particular character which may be used solely in future investigations on Purpura. Davenport ( ) says, "Confluent species are usually separated chiefly by one most distinctive character. This character may be termed the chief differential and may be used alone to measure the isolation and divergence of the groups, to test their specific value." If such a chief differential is found, it will be used to distinguish P. lapillus from others, in a later work. The characters chosen were Nuclear Angle, Adult Angle, Shape Ratio, Total Length, Imbrications, Sutures, Ribs, Excavation of the Columella and Teeth.

Nuclear Angle.--- The nuclear angle is the angle of growth made by the nuclear whorls. It is figured on Plate 2, Figs. 7 to 10. It may be less than, equal to, or greater than the adult angle. If it is less than the adult angle, it is difficult to measure, and so I have in all such cases recorded it as being 2 degrees less than the adult angle, which I regard as a fair estimate. If the nuclear angle is equal to, or greater than the adult, it can be measured with accuracy. As a matter of fact, there are fewer of the first type than of either the second or third.

The character of nuclear angle I chose because I thought it was the part of the shell which showed least the effect of

the individual's own environment, and would be more or less of a phylogenetic character. If we assume the inheritance of acquired characters, the nuclear whorl will show what influence the environment had on the previous generation. It will, then, be the part which tells the story of the inherited environment. But speculation aside, the fact remains that the nuclear whorls are formed withing the uterus or soon after leaving it and are in all probability little influenced by the individual's own environment.

Adult Angle.--- The adult angle is the angle made by the last whorl with the whorls above. It is practically the angle formed by a compass joint when each arm of the compass bears on the last whorl and one other point on the shell between the last whorl and apex. The adult angle may be smaller than, equal to, or larger than the nuclear. It is figured on Plate 2, Figs. 7 to 10. The character was chosen as being one which helped give the shell its form, variations in this respect being very apparent to the eye. Moreover, the "shoulder" of the shell, or the bulging last whorl characteristic of many shells is recorded by noting the adult angle. The agle corresponds very well to that which Bumpus ('98) used in measuring Littorina littorea. The accuracy of this measurement is probably to one degree.

Shape Ratio.--- This is the name which I have given to the ratio between the partial length and the total length of the shell. The partial length is measured on the ventral side of the shell, and is the vertical projection of the distance between the apex of the shell and the top of the aperture where

PLATE III.

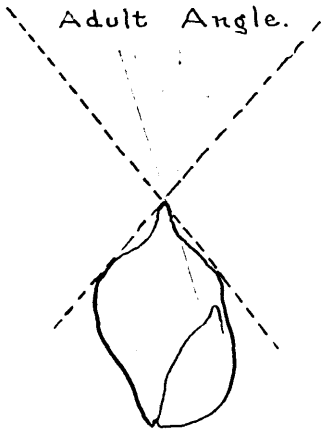


Fig. 7.

Fig. 8

Fig. 9.

Fig. 10

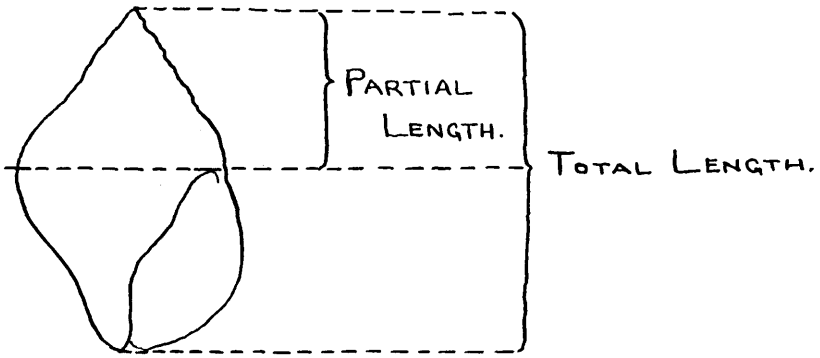


Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

the outer lip joins the columella. The total length is the length of a straight line joining the tip of the spire and the lowest point in the shell. The two lengths are seen on Plate 2, Fig. 11. The reason for choosing these two dimensions was that they played a part in determining the shape of the shell. The broadest part of the shell occurs as a rule, at the top of the aperture, so that the ratio outlines the contour of the shell fairly well, especially when taken in connection with the adult angle. A shell, for instance, with a shape ratio of 50 shows that the top of its aperture and probably its widest part is midway between the apex and the end, so that the shell is diamond-shaped. A ratio of 33.3 shows that the widest part of the shell is about 1/3 of the way down, and that the shell is consequently kite-shaped. Knowing also the adult angle in each case, we can outline roughly the shape of the shell. Again, too great exactness must not be insisted upon. By averaging a sufficiently large number of individuals, it is possible to get an estimate of the shape of a lot of shells in this way. The ratio R appears as $R = \frac{\text{Partial length}}{\text{Total length}}$.

Imbrications.--- Imbrications are longitudinal, fluted ridges which represent previous outer lips. Besides being of importance in indicating the rate of growth, they are important from a systematic point of view, since some species are invariably imbricated, while P. lapillus is as a rule not imbricated. It was found convenient to divide shells into three groups;-- 0, those not imbricated; 1, those slightly or somewhat imbricated; and 2, those well imbricated. The shells were arranged

in these groups by the eye, and forms were frequently met which were difficult to place. In the main, however, the system worked well and there was no difficulty in relegating most of the shells to their proper classes. The three types are shown on Plate 3, Figs. 16 to 18.

Sutures.--- Sutures are grooves, or channels, separating whorls and consequently run spirally around the shell. Here again the shells were grouped into classes according to depth of sutures. The first class, 0, contained shells without a trace of a suture; class 1, shells with slight or very shallow sutures; class 2, shells most markedly sutured. None of the P. lapillus found showed very marked suturing, though many showed quite distinct sutures. The character is valuable, since many allied species have marked sutures. The character was a difficult one to measure. It is figured on Plate 3, Figs. 19 to 21.

Ribs.--- Ribs are ridges on the surface of the shell parallel to the whorls. They are well seen on Plate 3, Figs. 22 to 24. The shells were put into three classes:--0, those without ribs (smooth shells); 1, those somewhat or obsoletely ribbed; and 2, those well ribbed. It was a comparatively easy matter to distinguish these three types.

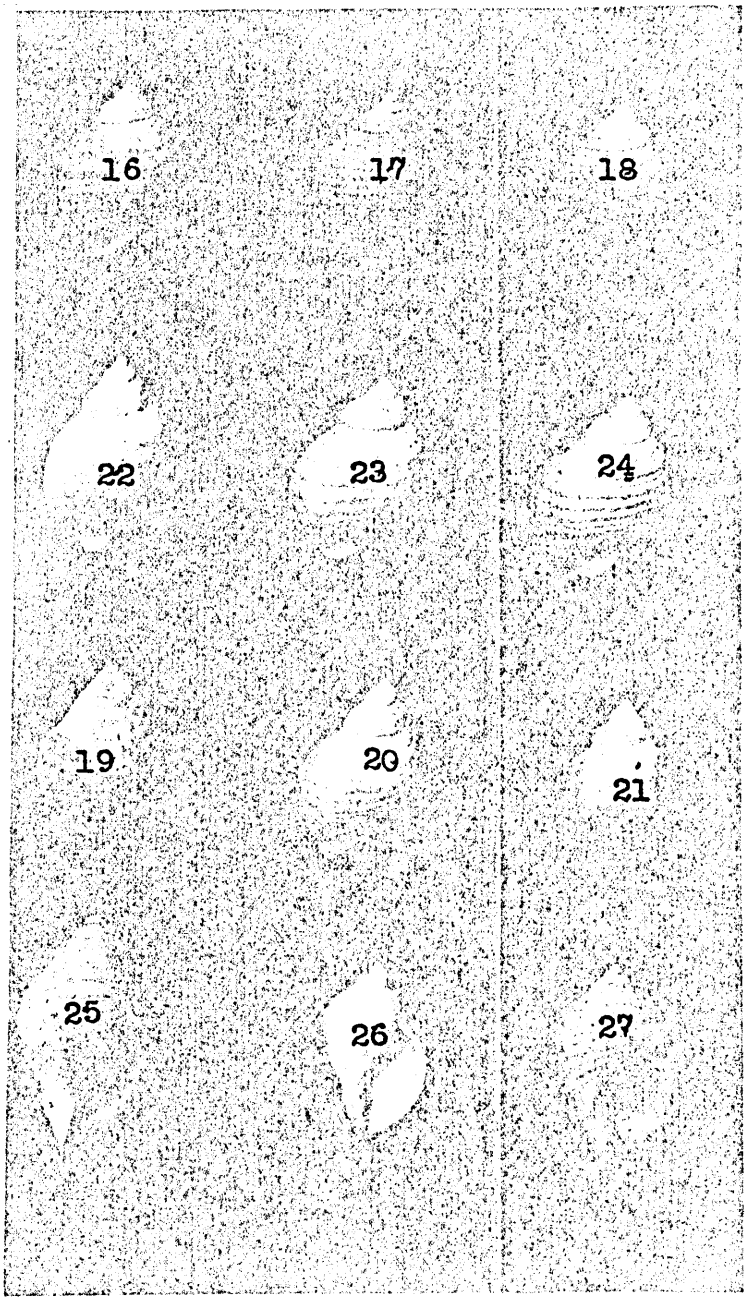
Teeth.--- These are outgrowths of the shell which occur on the inside of the outer lip just in from the edge. The shells show great variation in this character, whole sets being without teeth, and other groups having a large number of cases of well developed teeth. This leads us to think that this character may

be due to some general cause like nature of location, or that it may be correlated, or, as Tryon suggests ('82), with the age of the shell. "The outer lip is usually thin and sharp in immature shells, but is thick in adults as a rule and possesses calcareous projections called teeth."

Thickness.--- Although thickness has not been measured in connection with this research (the column so headed is not used, being based on an incorrect principle), it must be noticed briefly. The species varies widely in thickness, shells being much thicker in some localities than in others. Shells become thickened by an increased secretory activity, and thick shells become thinner by absorption of the shell material by the animal.

Weight.--- Every shell was weighed, the scales being read to 0.1 of a gram and the weight recorded. The shells were prepared for weighing as follows:-- The muscular region was in all cases removed, the splanchnic region either was or was not removed, at its option, so to speak, while the hepatic region was in no case removed. The average weight of the middle third was 0.2 of a gram, and that of the part left in also 0.2 of a gram. Varying amounts of moisture bring the probable error in weighing to about 0.5 of a gram.

Columella.--- The columella is the central apire of the shell which at the last whorl forms the inner border of the aperture. The character of this part of the columella varies greatly in different individuals, and in some species constitutes a specific difference. In order to measure it, I observed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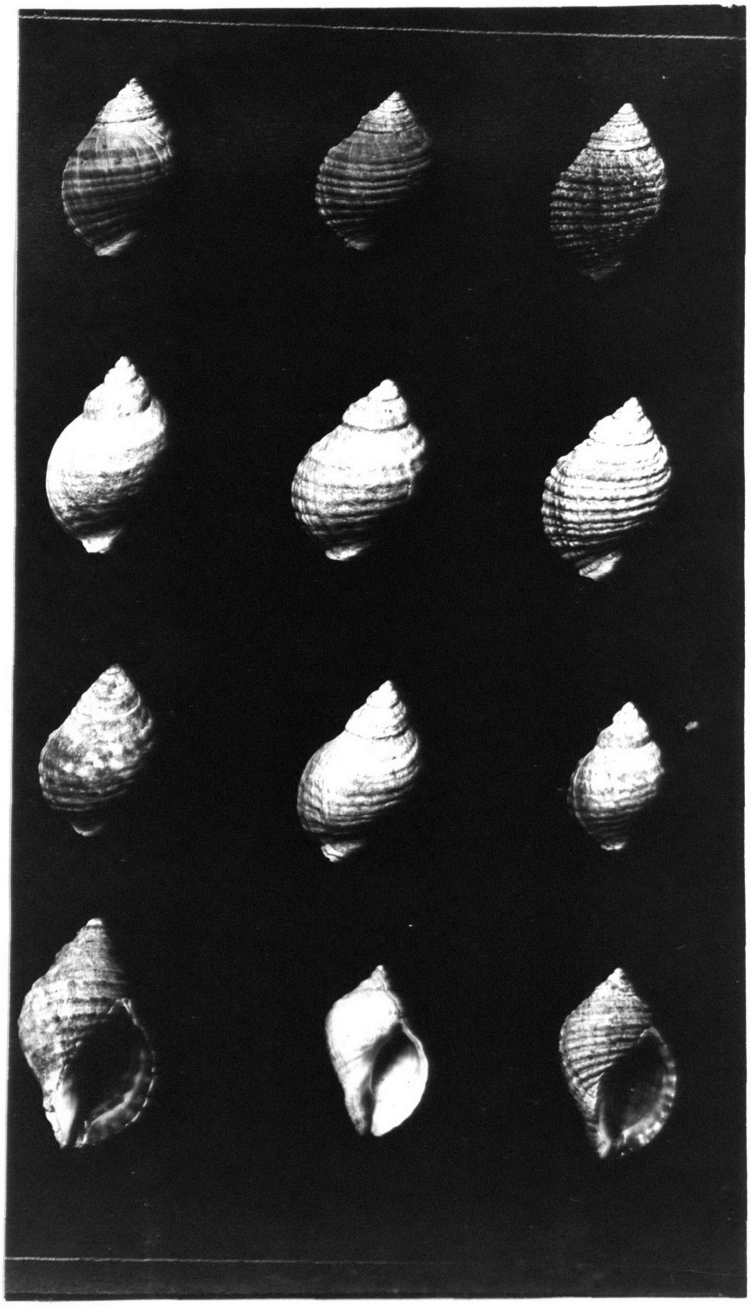


to what extent the surface of the columella forming the inner side of the aperture deviated from a straight line. Figs. 12 to 15, Plate 2, show what arbitrary types of columella excavation were chosen. When there was no departure from a straight line, it was called 0, and successively greater departures were called 1, 2 and 3. There was rarely any difficulty in separating the shells according to this character.

THE MEASURING INSTRUMENTS.--- Nuclear angle, adult angle, total length and shape ratio were all measured with one instrument, which I devised for the purpose. This instrument I have called, for want of a better name, a conchometer. It consists essentially of a modified compass joint and protractor scale for measuring and reading angles, and a millimeter scale arranged to read off the total and partial lengths. The instrument is figured on Page 4. The compass joint is provided with two arms bearing flanges which project outward 3/4 of an inch. The left arm is fixed to the backboard, its tip being at zero of the paper scale affixed to the board. This scale is covered with celluloid, and over it the other arm moves freely. The scale has an arc of 105 deg. and can be read directly to .5 deg. Parallel to the backboard and in front of the edges of the flanges is fixed a glass plate on the surface of which is etched a series of 60 arcs one millimeter apart, starting with 3 m.m. from the centre. The centre is accurately placed over the pivotal centre of the compass joint, and firmly cemented to a block attached to the backboard. A similar scale ruled in ink is attached to the backboard in such a way that corresponding arcs will coincide on the two scales, as one sights across. This is

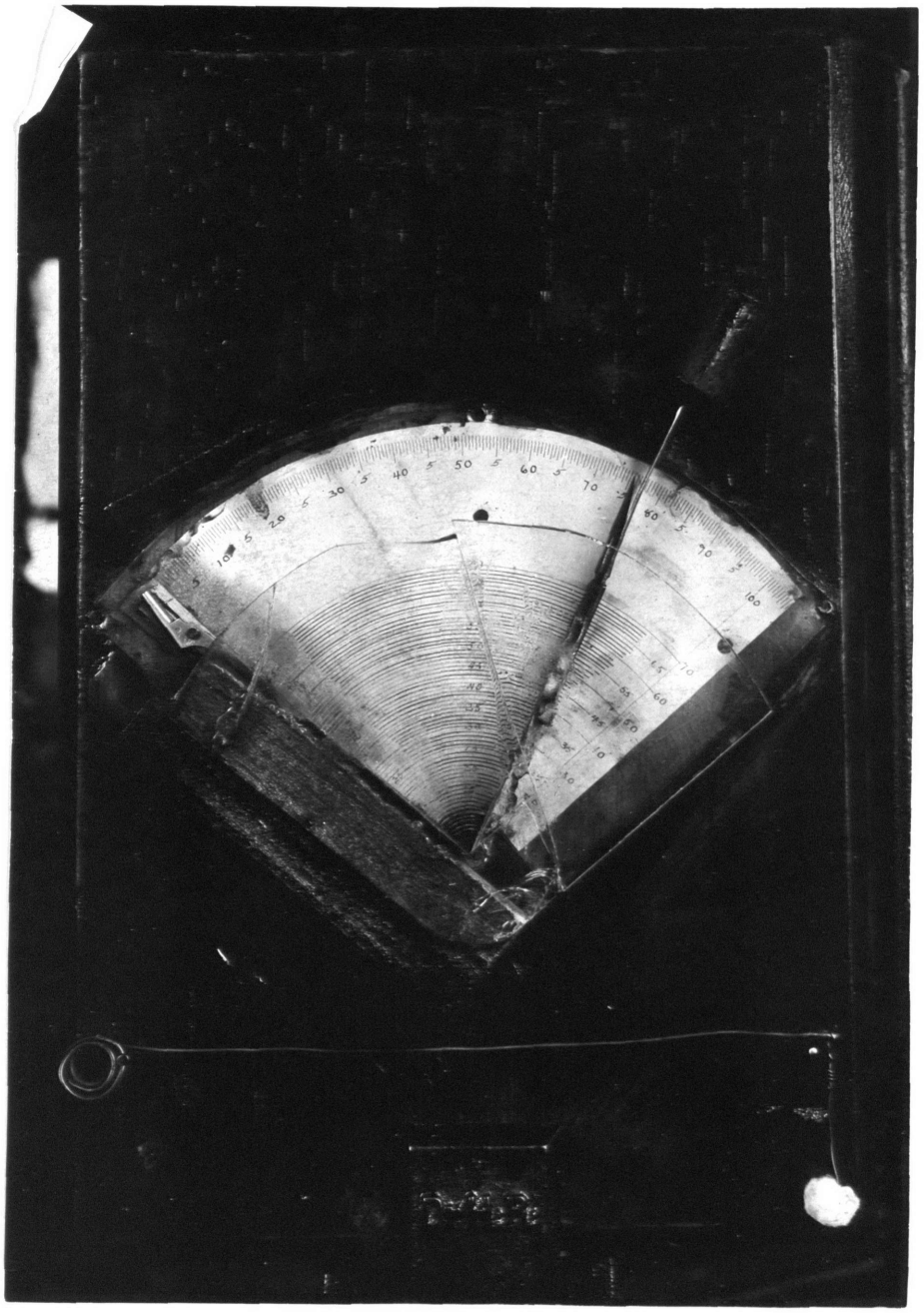


FIG. 29.

to avoid errors in reading due to parallax. To use the instrument, the backboard is secured in a vertical position. The shell is measured by lowering it in such a way that its apex is downwards with its ventral side outwards. It is lowered by means of a rod shown in the figure as hanging from a peg in the backboard to the left of the joint. It consists of a piece of stiff wire 7 1/2 in. long, made with an eye at the lower end, to which is fastened a piece of medium wire 1 in. long. bearing at its terminal end a plug of cotton wool. This plug is inserted into the aperture of the shell and in this way the shell can be handled conveniently. When the shell is in place, the movable arm of the compass is adjusted to fit the shell, and the angle which it makes is read off on the scale. After this the adult angle is measured. The nice fit of the joint to the shell depends on the manipulation. Greater accuracy is obtained by keeping the inner surfaces of the flanges polished, so that the coincidence of the whorls can be determined by the method of reflections. The adjustment being made, the angle is read off on the scale and recorded. After both angles have been measured, the arm is moved to let the shell descend as far as it will and the total length is found by sighting across the end of the shell and taking the reading. The partial length (the length from the apex to the place where the lip joins the body of the shell) is read by noting where this point comes on the glass plate. These measurements having been taken, the shell is removed, its sculpture noted, and it is then weighed. A concenient form of scales is the one shown on Plate 5, Fig. 30. The

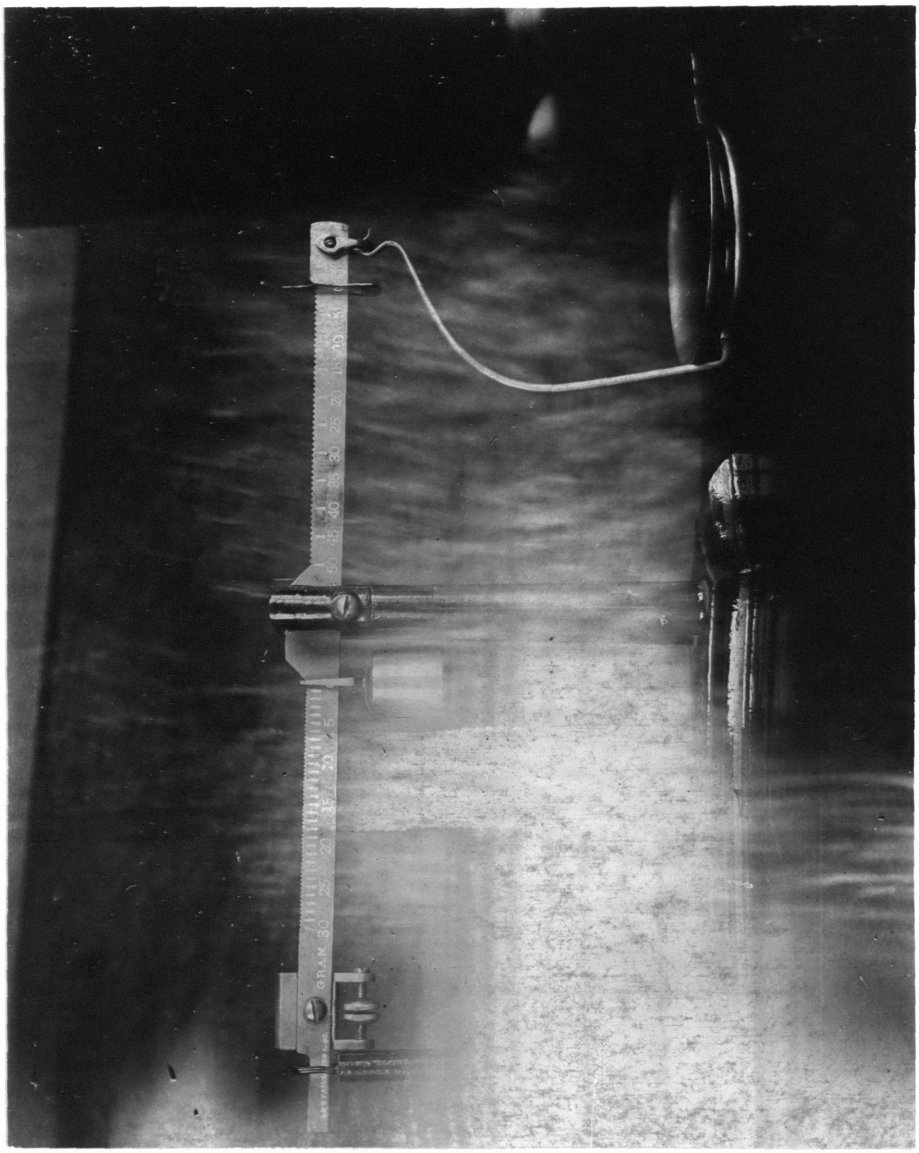


Fig. 30.

shell is then put into a shallow tray in its proper order so that it may be identified afterwards.

The data are obtained for the two sexes in each locality separately, the localities being taken one after another. I have measured the males first in all cases, but it is not probable that this would have any effect on the reliability of the observations.

The data are recorded on sheets showing also the sex and serial number of each individual, the data for a single specimen being found on one horizontal line. The column headed Shape contains the ratio R, found by dividing the partial by the total length, both of which characters are recorded on the sheet. The ratio was worked out on a slide-rule of convenient form, and one well adapted to the purpose. A figure of it is shown on Plate 5, Fig. 31. The principle on which the instrument is constructed is simple, and by it ratios can be worked out with great rapidity. All other data were recorded directly.

STUDY OF THE DATA.--- Having obtained the data, our next duty is, by plotting curves for each character, to determine in what way the individuals group themselves about the average, or to find out their density at different points of the probability curse. This will tell us whether the character in question varies conservatively about the mean, or average, or varies radically. This is done by first arranging the data of a single character (say, total length) of one sex of a single locality in numerical sequence from the least value to the highest. The numbers (called variates) are then grouped into classes of equal

range in such a way that, if possible, the classes will contain an increasing number of individuals as the mean is approached, that the class containing the largest number shall be nearest the mean, or better, that the mean may lie within this class, and that the classes shall lie symmetrically on each side of the class of greatest frequency. In other words, it is a legitimate proceeding so to manipulate the series of values as to get them into a curve approaching the curve of probability as a limit. There are several practical difficulties involved in this part of the method, which can be understood only by handling the data. In working for the end result, two factors are present; first, the inclusiveness of the classes, and second, the startingpoint of the series. It is always possible in homogeneous material so to choose these two factors that a normal frequency curve shall be obtained, but the proper combination is often hard to find.

We get by this process (called seriation of data) a series of classes having median values at equal numerical distances apart from the lowest to the highest, and the number of individuals occurring in each class known as the frequency of the class. It is now necessary to plot the curve of frequency, which is done by erecting rectangles along a base line where the breadths of the rectangles represent the class range, and the heights represent the number of observations i.e., the frequency of the class. The middle points of the tops of adjacent rectangles are then connected by straight lines, and the resulting broken line is known as the curve of frequency.

There are three constants of the curve which are especially useful in this work. They are the mode, the mean and the standard deviation. The mode is the middle quantity of the class of greatest frequency. The mean is the average magnitude of all the measurements, and in a normal curve lies at the centre of gravity of the polygon. It is indicated by the symbol M, and is found by the formula $M = \frac{\Sigma(V \cdot f)}{n}$ where V is the magnitude of any class; f its frequency; Σ indicates that the products of the magnitudes multiplied by the frequency of all the classes are to be added together; and n is the number of variates, or individuals measured.

The standard deviation, denoted by σ, is a measure of the variability of a character, since it becomes greater as the character becomes more variable and less as the character becomes less variable. The standard deviation is a concrete number, being expressed in the same unit, (degrees, per cent., millimeters, grams) as the magnitude of the character. The constant is found by the formula $\sigma = \sqrt{\frac{\Sigma(x^2 \cdot f)}{n}}$, where x is the deviation of the class from the mean; f, the frequency of a class; and Σ as before, indicates the summation of the various products; n being the number of variates.

Having found these constants, we have a ready means of comparing each character separately (1) in the two sexes, (2) in two localities widely separated, (3) in different environments in the same locality. We can thus hope to connect the individuals with the environment and prove statistically that differences in one are coincident with differences in the other.

The data following have been carefully revised, and mis-

takes eliminated so far as possible, and it is hoped that they will bear critical examination.

COLLECTION NO. 1.

MALE SHELLS FROM EASTPORT I.

101 SPECIMENS.

EASTPORT I. Males.

Collection made Sunday, December 3, at 2:30 P. M. at Easter's Head, Eastport, Me.

Position sheltered, being in a cove (Prince's Cove). The shells were gathered partly from the rocks lining the cove, and partly from under a wharf where the wave action was somewhat less. The shore was rocky, rugged and covered with rock-weed. (Fucus). The food supply is made richer than it otherwise would be by the fish gurry and drippings from the wharf, to which fact I attribute the large number of whelks (Buccinum) and sea-urchins in the immediate neighborhood. The stratum is on the whole muddy.

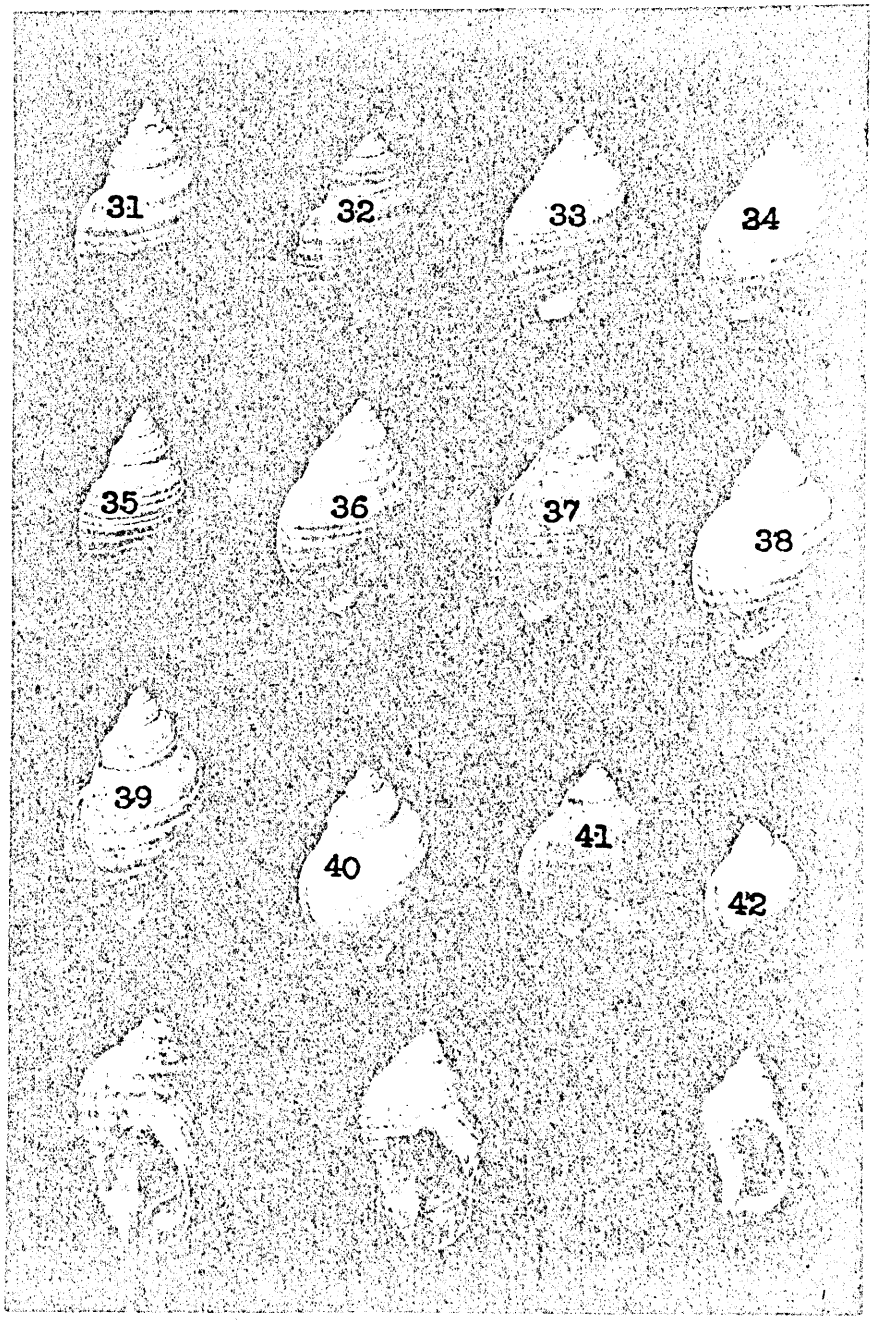
The Purpura grew not far from low water mark, and were found growing in their characteristic way (p. 3). They were uniformly colored brown, immitating closely the surrounding rock. The brown varied from a dark chocolate to dull yellow. A sketch of the surroundings is annexed.

For valuable suggestions as to collecting, etc., I am indebted to Mr. Jerry Sullivan, of Eastport, the famous old boatman who has piloted the naturalists of the last two decades around that rich locality.

PLATE VI.

EASTPORT I. Males.

Figs.	31-34	Nuclear Angle.
"	35-38	Adult "
"	39-42	Total Length.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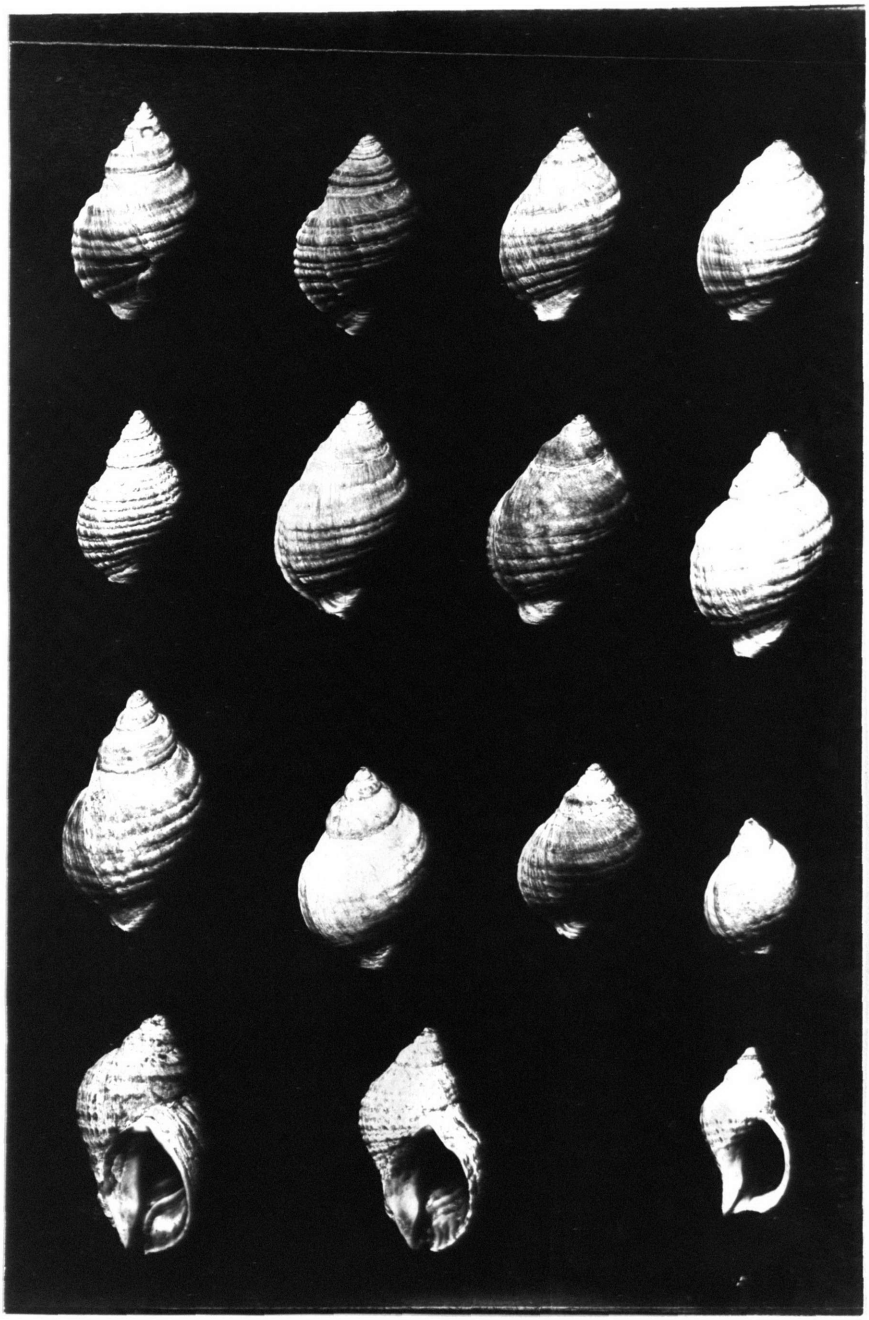


Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	72.0	72.0	30.	11.	36.7	10.3	0	0	1	0	1	3.10			1
θ	73.2	73.2	29.5	12.	40.5	5.18	0	0	1	1	1	1.53			2
θ	74.3	76.7	26.	8.	30.7	5.88	0	0	1	0	0	1.53			3
θ	75.5	75.5	27.	10.	37.0	5.59	0	0	0	0	1	1.51			4
θ	76.5	76.5	27.	11.	40.7	9.00	0	0	1	0	1	2.43			5
θ	75.5	75.5	26.	10.	38.5	5.91	0	0	0	1	0	1.54			6
θ	74.7	71.0	29.5	12.	40.5	5.22	0	0	0	0	1	1.55			7
θ	77.5	74.5	29.5	11.5	39.0	6.87	1	0	1	1	1	2.30			8
θ	73.7	73.7	26.	9.	34.7	5.32	0	0	0	0	0	1.39			9
θ	74.0	74.0	23.	9.5	41.3	5.56	0	0	1	0	0	1.28			10
θ	69.0	59.5	35.	15.5	44.2	10.1	0	0	0	1	1	3.51			11
θ	71.0	66.0	32.	10.	31.2	7.91	0	0	0	0	1	2.54			12
θ	69.5	64.5	31.	10.7	34.5	8.12	0	0	1	0	1	2.52			13
θ	65.5	61.5	31.	12.	38.7	8.03	0	0	1	1	0	2.50			14
θ	75.5	75.5	30.	10.	33.5	10.3	0	0	2	1	0	3.10			15
θ	75.0	75.0	27.	11.	40.7	5.52	1	0	0	0	2	1.50			16
θ	75.0	72.0	28.	12.	42.8	8.73	2	0	0	0	2	2.45			17
θ	72.5	72.5	28.	10.	35.7	5.48	0	0	0	0	1	1.54			18
θ	75.5	72.5	31.	13.	42.0	7.90	1	0	1	0	1	2.45			19
θ	76.5	76.5	26.5	10.	37.7	8.09	0	0	1	0	1	2.15			20
θ	75.0	75.0	27.	10.	37.0	5.62	2	0	0	0	2	1.52			21
θ	74.5	67.5	28.5	10.5	36.8	8.76	0	0	1	0	0	2.50			22
θ	71.5	66.0	26.5	11.	41.4	5.72	0	0	1	1	1	1.52			23
θ	69.0	64.5	27.	12.	44.4	5.58	0	0	1	0	0	1.51			24
θ	72.0	72.5	31.	12.	38.7	8.35	0	0	2	1	0	2.58			25

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight	No.
θ	75.5	70.5	25.5	10.	39.3	5.91	2	0	0	0	1	1.51	26
θ	78.0	78.0	24.5	10.	40.7	6.00	0	0	1	0	1	1.20	27
θ	74.0	70.0	31.5	12.	38.0	7.95	0	0	1	0	1	2.51	28
θ	72.5	66.0	34.	13.5	39.6	11.5	0	0	1	1	1	3.51	29
θ	76.5	76.5	29.5	10.	34.0	9.00	0	0	1	1	0	2.65	30.
θ	72.0	69.5	28.	10.	35.7	8.95	0	0	1	0	1	2.50	31
θ	75.0	75.0	27.	10.5	38.9	5.70	0	0	1	1	0	1.54	32
θ	67.0	64.0	25.	10.	40.0	6.30	0	0	1	2	0	1.54	33
θ	76.0	76.0	26.	10.	38.5	8.48	0	0	1	1	0	2.21	34
θ	70.0	69.0	25.	9.5	38.0	7.38	0	0	1	1	1	1.85	35
θ	71.0	71.0	26.	11.	42.3	6.72	1	0	0	1	1	1.75	36
θ	70.0	70.0	27.	10.5	38.8	7.40	1	0	1	1	2	2.00	37
θ	72.5	72.5	30.	13.	43.3	7.50	0	0	1	0	1	2.25	38
θ	70.0	70.0	28.	11.	39.3	7.70	0	0	2	1	1	2.17	39
θ	70.0	70.0	25.	11.	44.0	4.47	0	0	1	0	1	1.12	40
θ	66.0	66.0	26.5	10.	37.8	5.50	0	0	1	0	0	1.46	41
θ	67.0	67.0	25.	10.	40.0	5.67	0	0	0	1	1	1.42	42
θ	78.0	78.0	23.	8.	34.8	6.51	0	1	1	0	0	1.50	43
θ	72.0	72.0	22.	7.	31.8	4.68	0	0	0	1	0	0.33	44
θ	75.0	65.5	30.	8.	26.7	12.7	0	1	0	0	1	3.80	45
θ	63.5	61.5	31.5	13.5	42.7	7.02	0	0	0	1	1	2.22	46
θ	65.0	65.0	30.	12.	40.0	7.42	0	0	0	1	1	2.43	47
θ	73.5	67.3	30.5	12.	39.4	11.2	0	0	1	0	1	3.42	48
θ	81.5	77.0	27.5	10.	36.5	9.66	0	0	2	1	0	2.66	49
θ	77.5	77.5	25.0	8.	32.0	6.22	0	0	2	0	0	1.56	50

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	73.0	73.0	33.	14.	42.4	12.5	0	0	2	1	1	4.10			51
θ	75.0	75.0	32.	13.	40.7	12.3	0	0	1	0	1	3.95			52
θ	77.5	65.5	30.	13.	43.2	6.92	1	0	1	1	1	2.07			53
θ	75.0	64.5	31.5	14.	44.3	9.85	0	0	1	1	1	3.10			54
θ	78.0	78.0	33.	13.	39.3	14.9	0	0	1	0	1	4.91			55
θ	81.5	81.5	31.	12.	38.6	9.55	0	0	0	0	1	2.95			56
θ	82.0	79.0	25.	11.	44.0	5.92	0	0	1	1	1	1.48			57
θ	71.0	64.0	27.	12.	44.4	7.46	0	0	1	1	1	2.02			58
θ	71.5	66.5	30.	13.	43.3	7.34	2	0	1	0	2	2.20			59
θ	74.0	74.0	27.	10.	37.0	6.92	0	0	0	1	1	1.87			60
θ	79.0	79.0	30.	12.	39.9	7.03	0	0	1	0	1	2.11			61
θ	78.0	78.0	27.	11.	40.8	10.95	1	0	1	0	2	2.95			62
θ	75.5	68.0	32.	14.	43.7	8.10	0	0	1	2	2	2.69			63
θ	71.0	71.0	30.	12.	40.0	8.85	0	0	1	0	1	2.69			64
θ	69.0	69.0	29.	13.	44.7	9.20	0	0	1	0	1	2.67			65
θ	73.5	68.0	29.5	12.	40.6	10.58	0	0	0	0	1	3.12			66
θ	72.0	72.0	25.5	11.	43.0	6.15	0	0	1	1	0	1.57			67
θ	67.0	56.0	25.5	11.	43.0	4.58	1	0	0	1	2	1.17			68
θ	76.0	76.0	27.	11.	40.7	11.4	0	1	1	0	0	3.16			69
θ	80.0	80.0	25.	10.	40.0	7.25	0	0	0	0	1	1.81			70
θ	74.5	74.5	27.	10.	37.0	6.70	0	0	1	0	1	1.80			71
θ	75.5	70.0	26.5	10.	37.7	6.20	0	0	0	1	1	1.65			72
θ	72.5	65.0	27.	10.	37.0	8.10	0	0	1	1	1	2.17			73
θ	80.0	75.5	27.5	12.	43.6	9.10	1	0	1	1	2	2.50			74
θ	72.5	72.5	30.5	12.5	40.9	8.65	0	0	1	1	1	2.02			75

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	74.5	74.5	23.	9.	39.2	7.80	1	0	0	1	2	1.08			76
θ	84.5	79.0	27.	9.	33.3	8.05	0	0	1	0	1	2.18			77
θ	72.0	72.0	22.	9.	41.0	3.87	0	0	2	1	0	0.85			78
θ	72.5	72.5	25.	11.	44.0	4.70	0	0	1	1	1	1.18			79
θ	75.0	75.0	27.	10.	37.2	7.22	0	0	1	0	1	1.95			80
θ	71.0	69.0	29.	10.	34.5	7.56	1	0	2	0	2	2.25			81
θ	67.0	60.0	30.	11.	36.6	7.00	0	0	1	0	0	2.10			82
θ	74.0	70.5	30.	11.	36.6	9.77	0	0	2	0	2	2.94			83
θ	76.5	76.5	28.	11.	39.2	6.42	1	0	1	0	2	1.80			84
θ	77.5	69.0	31.	11.	35.4	8.90	0	0	2	0	0	2.75			85
θ	65.0	65.0	24.5	10.	40.9	2.08	0	0	1	1	1	0.50			86
θ	75.5	75.5	24.5	9.5	38.8	5.12	0	0	2	2	1	1.26			87
θ	70.0	70.0	26.5	10.	37.8	5.50	0	0	1	1	1	1.46			88
θ	68.0	68.0	23.7	9.	38.0	3.35	0	0	1	1	1	0.77			89
θ	69.0	69.0	27.5	11.	40.0	3.40	0	0	1	0	1	0.93			90
θ	68.5	68.5	29.5	13.	44.0	6.28	0	0	0	1	1	1.87			91
θ	67.0	67.0	28.	11.	39.2	5.57	0	0	1	1	1	1.56			92
θ	80.0	80.0	26.5	11.	41.4	7.10	1	0	2	1	2	1.88			93
θ	71.0	69.0	24.5	9.5	38.7	5.48	0	0	1	1	0	1.35			94
θ	74.5	74.5	27.	10.	36.9	5.78	1	0	2	2	1	1.56			95
θ	71.5	71.5	30.5	12.	39.3	7.85	0	0	2	1	0	2.38			96
θ	70.0	70.0	25.	10.	40.0	4.75	0	0	1	0	1	1.19			97
θ	73.5	73.5	29.	10.	34.4	6.05	0	0	1	0	1	1.76			98
θ	72.0	72.0	26.	9.	34.6	6.70	0	0	2	0	0	1.75			99
θ	69.0	69.0	29.	11.	41.2	8.15	0	0	1	0	0	2.36			100
θ	76.5	76.5	25.	9.	36.0	7.65	0	0	0	0	1	1.91			101

Locality. Eastport I ♂ Seriation of Data.

~~100~~ 97 individuals.

Nuclear Angle.

63.5	69	71	72	73.5	75	75.5	77.5	84.5
65	69	71	72	73.7	75	75.5	77.5	
65.5	69	71	72.5	74	75	75.5	78	
65	69	71	72.5	74	75	76.	78	
66	69.0	71	72.5	74	75	76.	78	
67	69.5	71	72.5	74	76	76.5	79	
67	70	71.5	72.5	74.3	75	76.5	80	
67	70	71.5	72.5	74.5	75	76.5	80	
67	70	72	73.	74.5	75	76.5	80	
67	70	72	73.2	74.5	75.5	77.5	81	
68	70	72	73.5	74.5	75.5	77.5	81.5	
68.5	70	72	73.5	74.7	75.5	77.5	82	

Classes	61.0 - 65.0	66.0 - 70.0	71.0 - 75.0	76.0 - 80.0	81.0 - 86.0
	63.0	68.0	73.0	78.0	83.5
Frequency	3	21	45	24	4

Locality. Eastport I ♂ Seriation of Data.

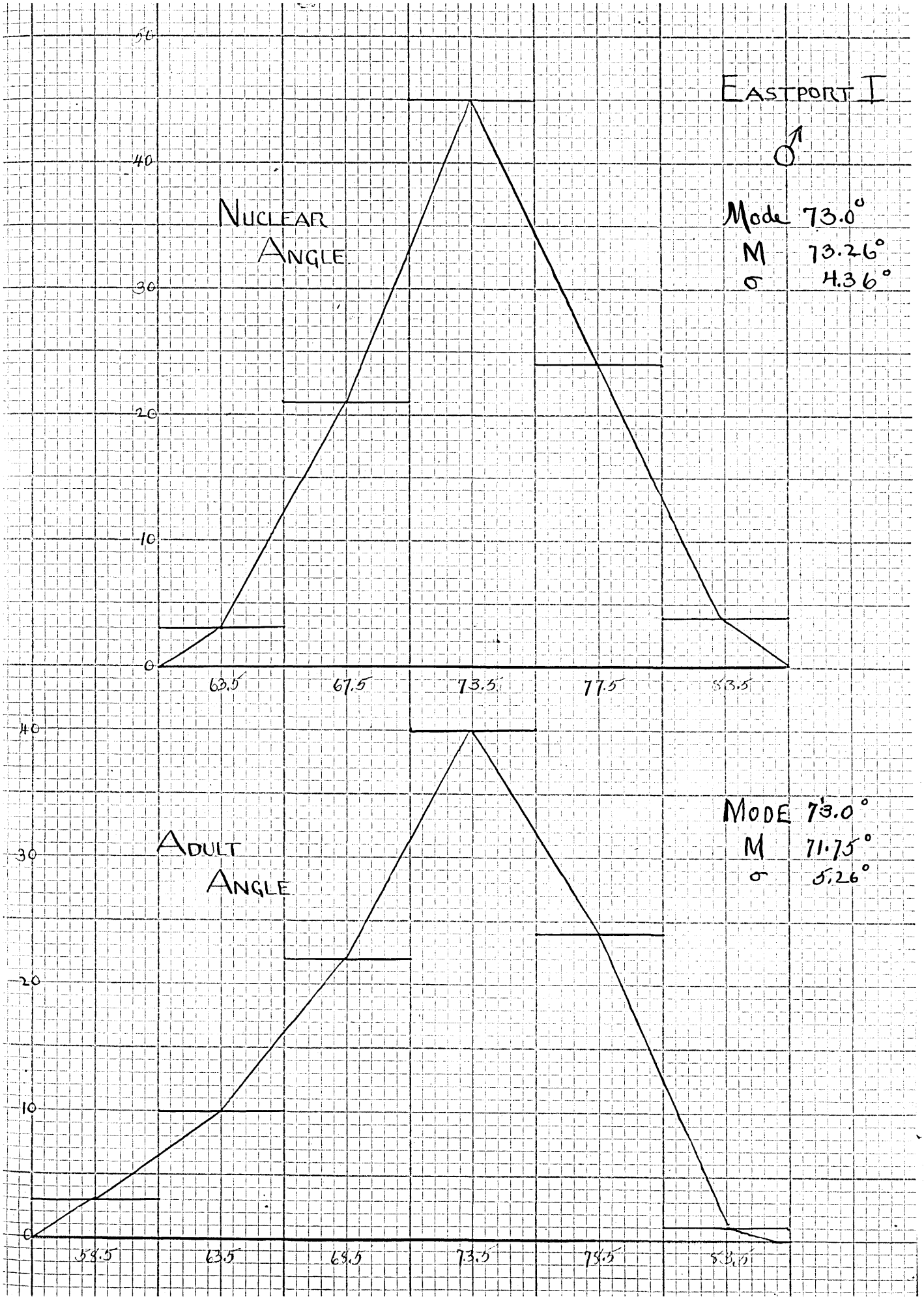
100 individuals

Gill Angle.

56.0	65	67	69	70	72	73	75	76	78
59.5	65	67	69	70	72	73.2	75	76	78
60	65	67.3	69	70	72	73.5	75	76	78
61.5	65.5	67.5	69	70.5	72	73.7	75	76.5	78
61.5	65.5	68	69	70.5	72	74	75	76.5	79
64	66	68	69.5	71	72.5	74	75.5	76.5	79
64	66	68	70	71	72.5	74.5	75.5	76.5	79
64.5	66	68.5	70	71	72.5	74.5	75.5	76.7	80
64.5	66	69	70	75	72.5	74.5	75.5	77	80
64.5	66.5	69	70	72	72.5	74.5	75.5	77.5	81.5

Class	56.0 - 60.0	61.0 - 65.0	66.0 - 70.0	71.0 - 75.0
	58.0	63.0	68.0	73.0
Frequency	3	10	22	40

Class	76.0 - 80.0	81.0 - 85.0
	78.0	83.0
Frequency	24	1


EASTPORT I
♂
NUCLEAR ANGLE
Mode 73.0°
M 73.26°
σ 4.36°
50
40
30
20
10
0
63.5
67.5
73.5
77.5
83.5
ADULT ANGLE
MODE 73.0°
M 71.75°
σ 5.26°
40
30
20
10
0
58.5
63.5
68.5
73.5
78.5
83.5

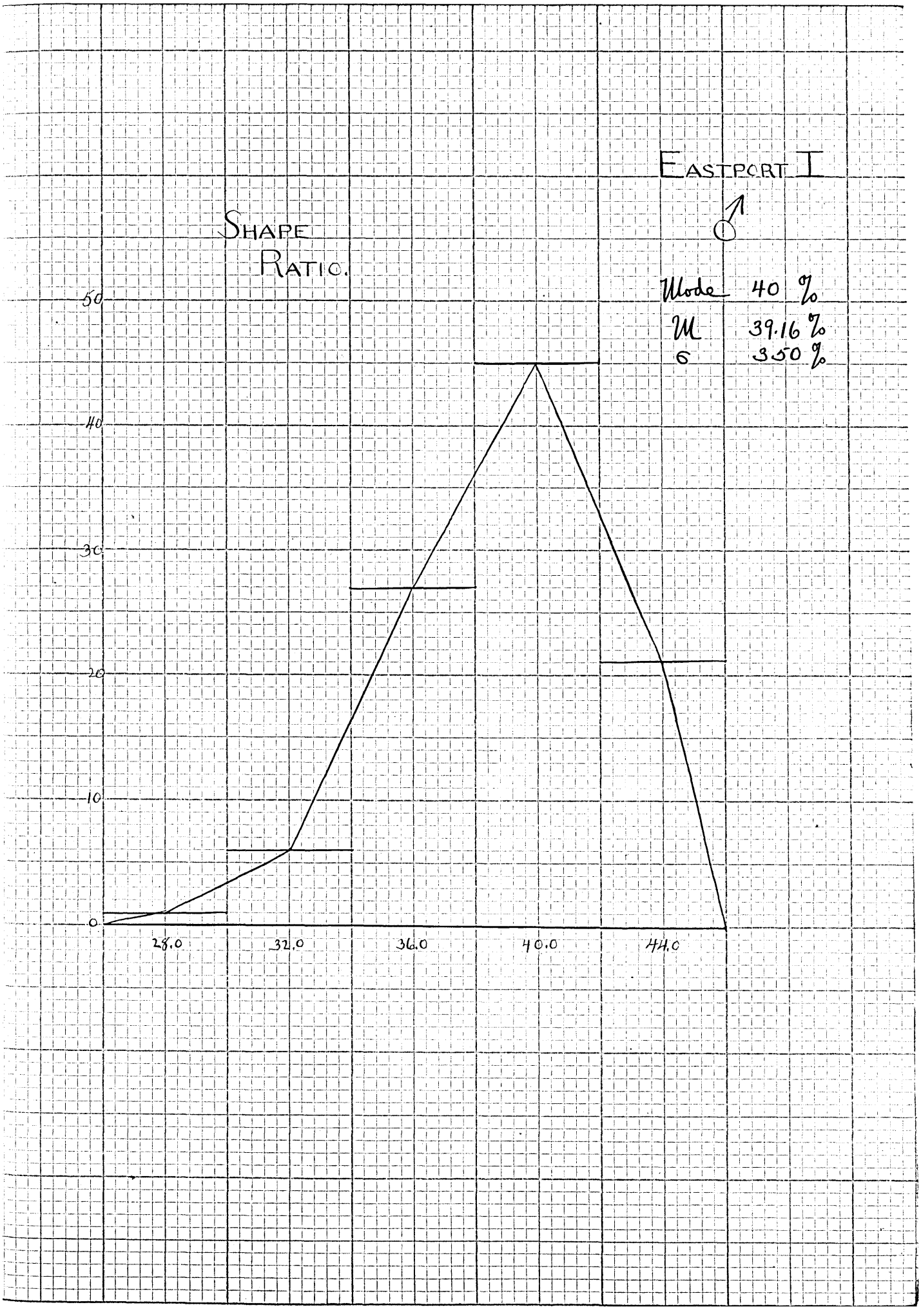
Locality, Eastport I ♂

Seriation of Data.

Ratio between total length and partial length.

1	26.7	35.7	37.7	39.0	40.0	41.0	43.3
2	30.7	36.0	37.7	39.2	40.0	41.2	43.6
3	31.2	36.5	37.8	39.2	40.0	41.3	43.7
4	31.8	36.6	37.8	39.2	40.0	41.4	44.0
5	32.0	36.6	38.0	39.3	40.5	41.4	44.0
6	33.3	36.7	38.0	39.3	40.5	42.0	44.0
7	33.4	36.8	38.0 38.0	39.3	40.6	42.3	4440
8	34.0	36.9	38.5	39.3	40.7	42.4	44.2
9	34.4 34.5	37.0	38.5	39.4	40.7.	42.7	44.3
10	34.5 34.6	37.0	38.7	39.6	40.7 40.7	42.8	44.4
11	34.7	37.0	38.7	39.9	40.7	43.0	44.4
12	34.8	37.0	38.8	40.0	40.8	43.0	44.7
13	35.4	37.0	38.8	40.0	40.9	43.2	
14	35.7	37.2	38.9	40.0	40.9	43.3	

Classes	26.0 - 29.9	30.0 - 33.9	34.0 - 37.9	38.0 - 41.9	42.0 - 45.9
	28.	32.	36.	40.	44.
Frequency	1	6	27	45	21


EASTPORT I
SHAPE
RATIO.
Mode 40 %
M 39.16 %
σ 3.50 %
50
40
30
20
10
0
28.0
32.0
36.0
40.0
44.0

E

Eastport I ♂

Seriation of Data

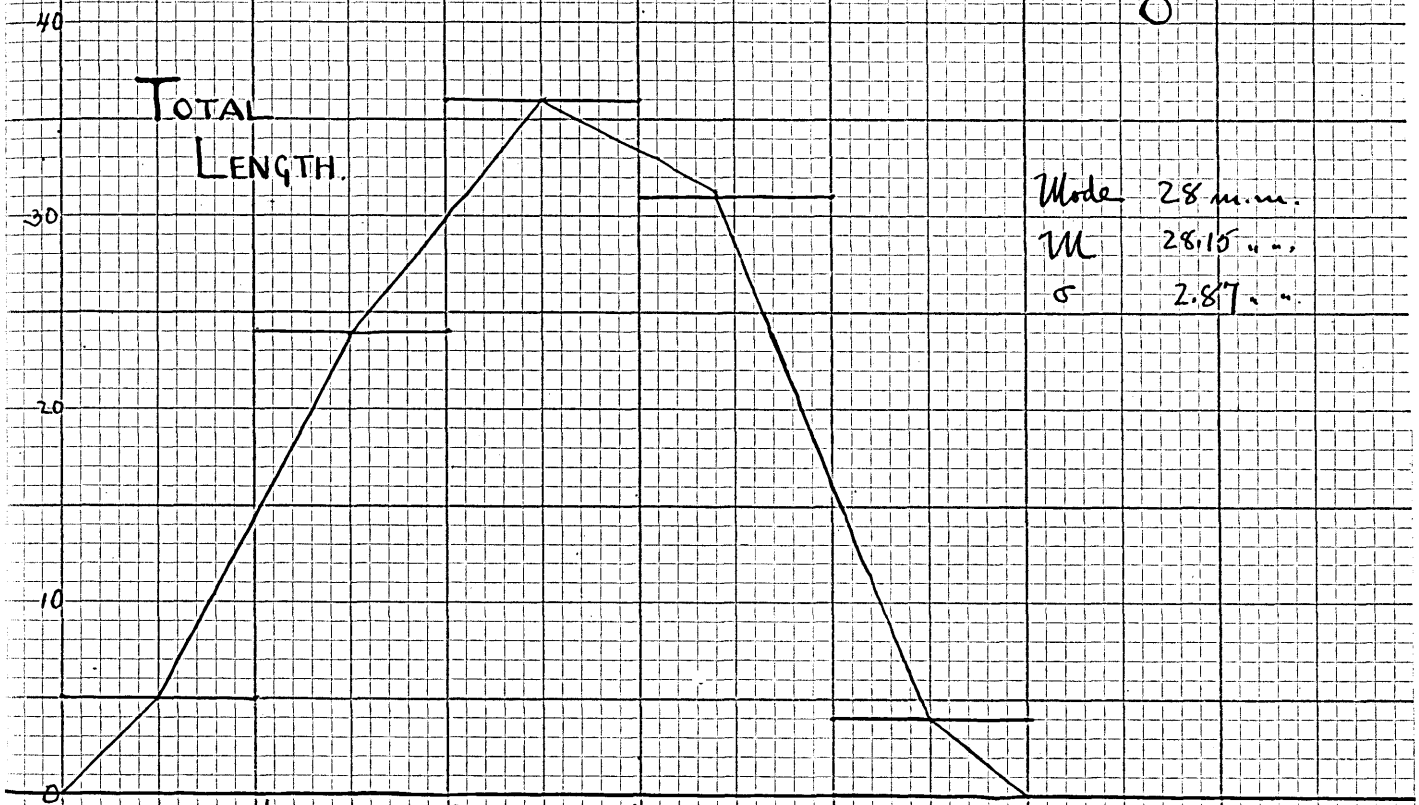
Total Length

1	22	25	26	27	28	29.5	30.5	34	
2	22	25	26.5	27	28	30	31	35	
3	23	25	26.5	27	28	30	31		
4	23	25	26.5	27	28	30	31		
5	23	25	26.5	27	28.5	30	31		
6	23.7	25	26.5	27	29	30	31		
7	24.5	25.5	26.5	27	29	30	31		
8	24.5	25.5	27	27	29	30	31.5		
9	24.5	25.5	27	27	29	30	31.5		
10	24.5	26	27	27.5	29.5	30	32		
11	25	26	27	27.5	29.5	30	32		
12	25	26	27	27.5	29.5	30	32		
13	25	26	27	28	29.5	30.5	33		
14	25	26	27	28	29.5	30.5	33		
Classes		21-23	24-26	27-29	30-32	33-35			
		22	25	28	31	34			
Frequency		5	24	36	31	4			

EASTPORT I

♂

TOTAL LENGTH.

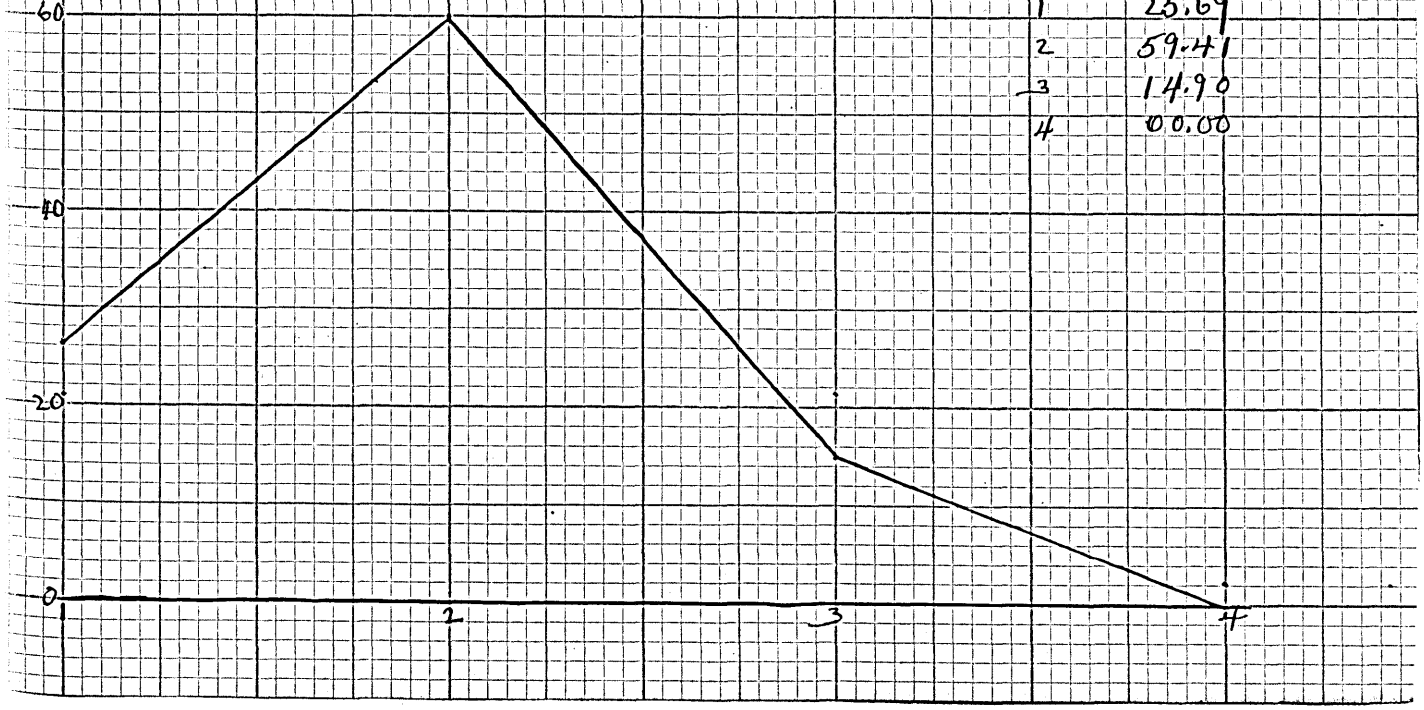


Mode 28 m.m.

M 28.15 " "

σ 2.87 " "

COLUMELLA.



1	25.69
2	59.41
3	14.90
4	00.00

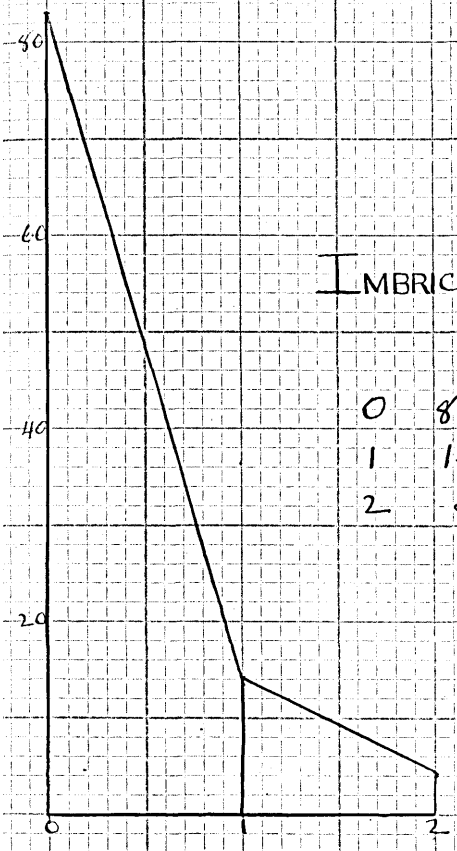
Locality. Eastport I ♂ — Seriation of Data.

Characters.

Imbrications.	Classes.	0	1	2	Total
	Frequency.	83	14	4	101
Teeth.	Classes.	0	1	2	
	Frequency.	98	3	0	101
Columella.	Classes	0	1	2	3
	Frequency	26	60	15	0
Sutures	Classes	0	1	2	
	Frequency	53	43	5	
Ribbing	Classes	0	1	2	
	Frequency	27	60	14	

IMBRICATIONS.

0	82.18
1	13.86
2	3.96

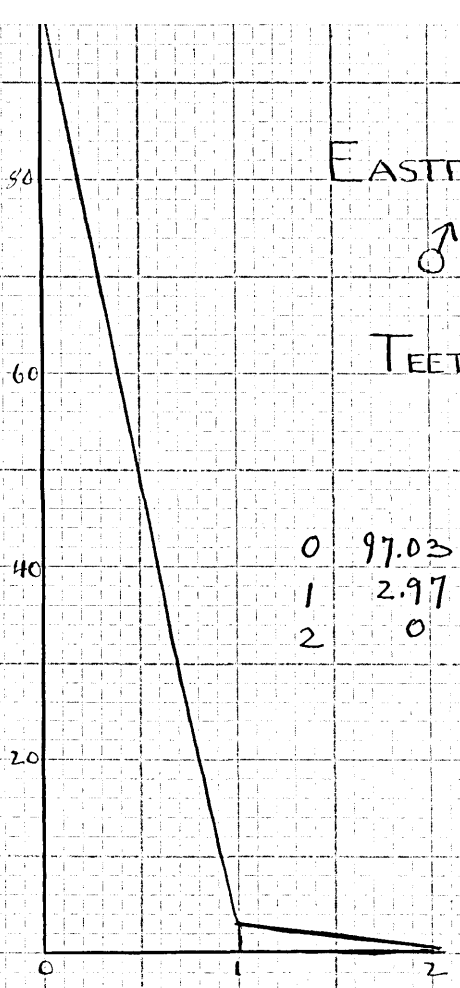


EASTPORT I

♂

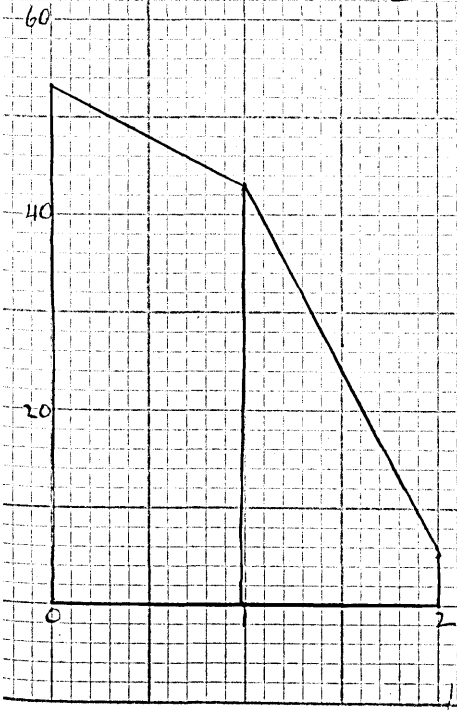
TEETH.

0	97.03
1	2.97
2	0



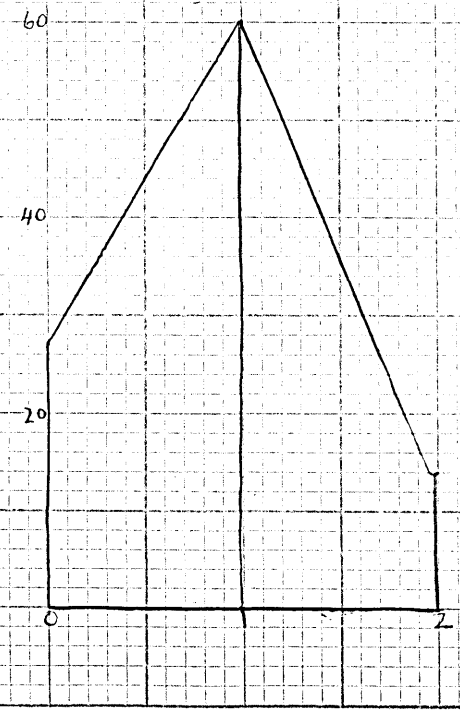
SUTURES.

0	52.48
1	42.57
2	4.95



RIBS.

0	26.73
1	59.41
2	13.86



COLLECTION NO. 2.

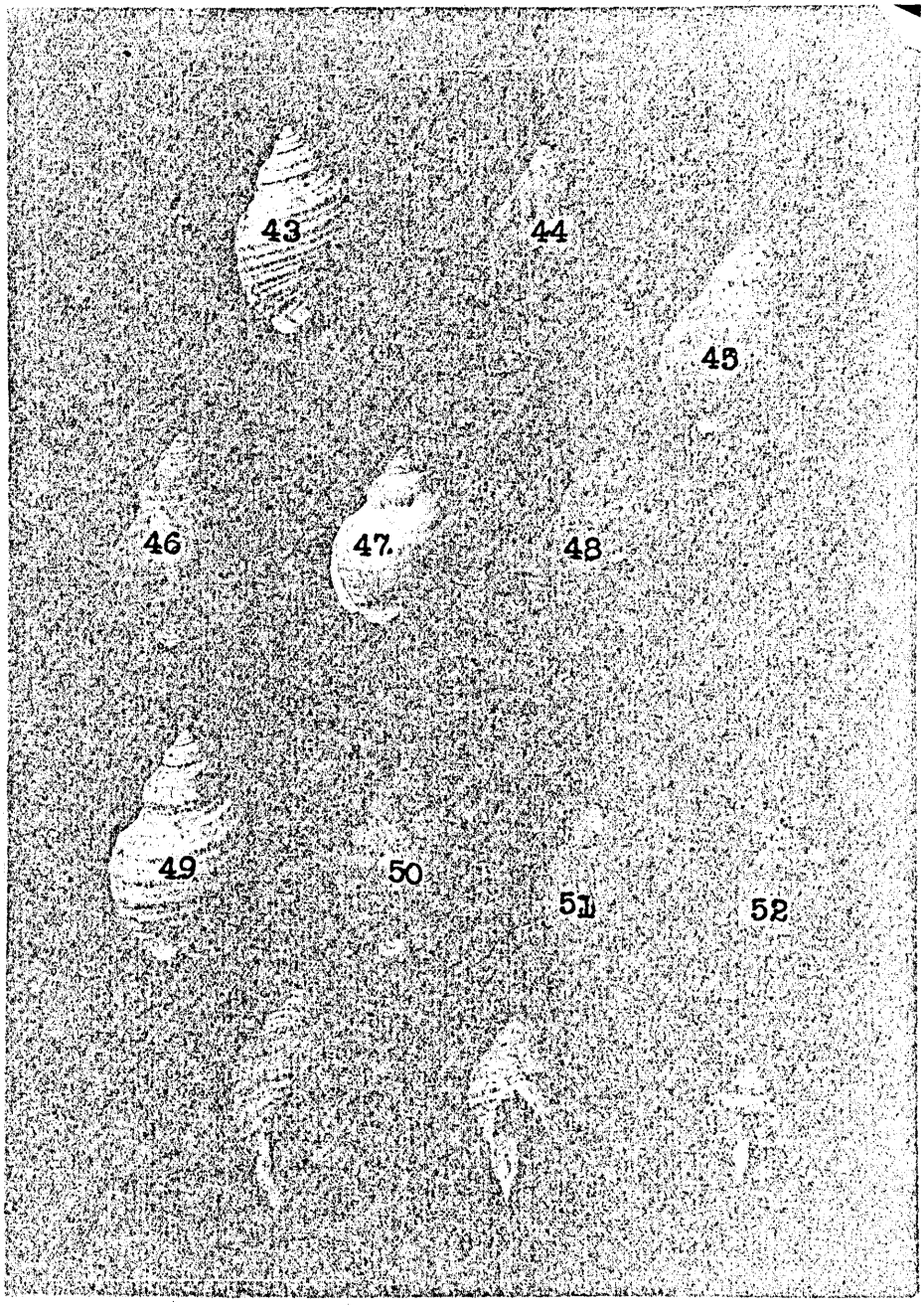
FEMALE SHELLS FROM EASTPORT I.

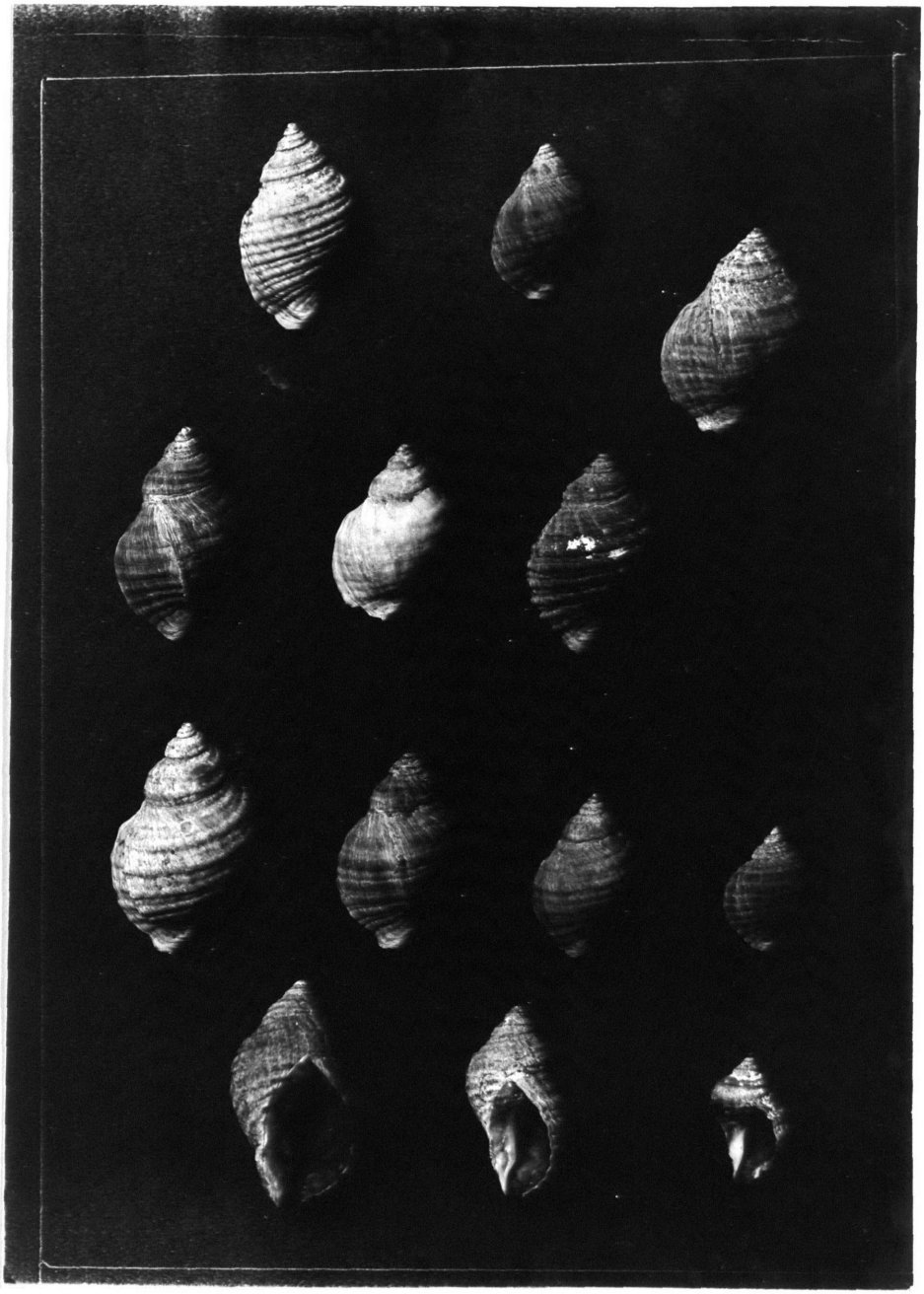
110 SPECIMENS.

PLATE VII.

EASTPORT I. Females.

Figs.	43-45	Nuclear Angle.
"	43, 46-48	Adult "
"	49-52	Total Length.


43
44
45
46
47
48
49
50
51
52



Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	73.5	73.5	32.	13.	40.5	10.9	0	0	1	0	0	3.50			1
♀	71.5	65.5	32.	14.	43.7	9.55	0	0	2	1	0	3.05			2
♀	75.0	71.0	30.5	12.	39.3	11.8	0	0	2	0	0	3.59			3
♀	77.5	71.5	35.	12.	34.2	15.2	0	0	1	1	0	5.39			4
♀	76.0	76.0	31.	13.	42.0	11.9	0	0	1	1	0	3.68			5
♀	74.5	78.0	29.	11.	38.0	6.95	2	0	1	0	2	2.02			6
♀	77.5	77.5	32.5	12.	36.8	14.3	1	0	1	0	0	4.68			7
♀	75.0	65.0	32.	12.	37.5	9.40	0	0	1	1	0	3.00			8
♀	65.0	60.5	32.	14.	43.7	6.80	0	0	1	1	0	2.14			9
♀	73.5	73.5	32.	13.	40.5	10.6	0	0	1	0	0	3.40			10
♀	75.5	75.5	31.	10.	32.2	9.70	0	0	2	0	0	3.00			11
♀	82.5	79.0	29.	11.	38.0	10.8	1	0	1	0	2	3.12			12
♀	71.0	71.0	31.	13.	42.0	8.10	0	0	1	1	0	2.49			13
♀	73.0	63.5	33.	14.	42.4	11.3	0	0	1	1	1	3.40			14
♀	73.5	65.0	36.	15.	41.6	12.7	0	0	1	1	1	4.57			15
♀	71.5	66.0	32.	13.	40.5	10.4	0	0	1	0	0	3.35			16
♀	79.0	73.5	31.	12.	3.86	11.6	0	0	1	0	0	3.59			17
♀	73.0	67.5	31.	12.	38.6	9.92	1	0	1	0	2	3.17			18
♀	72.5	72.5	32.	14.	43.7	8.25	2	0	2	1	2	2.64			19
♀	79.0	74.0	29.5	10.	33.8	10.1	0	0	2	0	0	3.00			20
♀	76.0	76.0	30.	10.	33.4	8.95	0	0	2	1	0	2.68			21
♀	75.0	75.0	30.	11.	36.6	7.35	2	0	0	0	2	2.20			22
♀	80.0	80.0	30.	11.	36.6	9.50	1	0	1	1	2	2.86			23
♀	78.5	78.5	29.	11.	37.8	11.5	0	0	1	0	1	3.35			24
♀	74.5	62.0	33.	14.	42.4	10.9	0	0	0	1	1	3.58			25

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
♀	81.0	75.5	32.	12.	37.5	13.3	1	0	1	0	1	4.25			26	
♀	76.5	76.5	27.	10.	37.3	6.78	0	0	1	0	1	1.83			27	
♀	73.0	73.0	26.	10.	38.3	6.23	0	0	1	0	1	1.62			28	
♀	70.5	70.5	26.	11.	42.3	6.35	0	0	1	1	1	1.65			29	
♀	77.5	73.0	27.	10.	37.3	6.60	0	0	0	0	1	1.72			30	
♀	74.0	74.0	30.	13.	43.3	8.75	2	0	2	1	2	2.62			31	
♀	71.5	71.5	33.	12.5	37.8	10.2	0	0	1	0	1	3.38			32	
♀	73.5	73.5	27.	10.	37.3	9.45	0	0	-	1	0	2.55			33	
♀	71.5	69.5	28.	10.	35.7	7.55	1	0	1	0	1	2.11			34	
♀	71.0	69.0	28.	11.	39.3	5.65	2	0	0	1	2	1.53			35	
♀	75.0	71.0	26.	10.	38.5	5.90	0	0	1	0	0	1.53			36	
♀	70.5	70.5	28.	11.	39.3	7.35	0	0	1	1	0	2.06			37	
♀	71.5	67.5	33.	15.	45.4	10.2	0	0	1	1	0	3.39			38	
♀	80.0	78.0	30.	10.	33.4	10.2	0	0	2	1	1	3.14			39	
♀	80.0	76.5	33.	11.	33.4	10.2	0	0	2	1	1	3.40			40	
♀	75.5	75.5	28.	11.	39.3	7.5	2	0	1	1	1	2.10			41	
♀	76.0	76.0	27.	11.	40.8	8.43	0	0	0	0	1	2.27			42	
♀	74.5	74.5	34.	13.	38.3	8.15	1	0	1	1	2	2.77			43	
♀	72.5	67.0	28.	13.	46.4	6.10	0	0	0	0	1	1.71			44	
♀	76.0	73.5	29.	10.	34.5	6.90	0	0	1	0	0	2.00			45	
♀	79.0	79.0	32.	12.	37.4	9.10	0	0	1	0	2	2.92			46	
♀	75.0	67.0	32.	14.	43.6	10.2	0	0	1	1	1	3.30			47	
♀	76.5	68.0	33.	14.	42.4	13.8	0	0	1	1	0	4.58			48	
♀	79.5	76.0	32.	10.	31.2	11.0	0	0	2	0	0	3.66			49	
♀	72.0	70.0	32.	14.	43.7	9.40	0	0	2	0	0	3.00			50	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	70.0	70.0	30.	12.	40.0	9.65	0	0	1	1	0	2.89			51
♀	72.5	69.0	32.	12.	37.5	7.45	0	0	1	0	1	2.38			52
♀	65.5	61.5	32.	14.	43.7	13.0	0	0	2	1	0	4.17			53
♀	75.0	75.0	30.	10.	33.4	7.50	2	0	0	1	2	2.25			54
♀	79.5	75.0	29.	11.	38.0	8.25	0	0	1	2	0	2.39			55
♀	70.0	66.5	33.	15.	45.4	11.3	0	0	2	1	0	3.70			56
♀	78.0	78.0	27.	9.	33.3	9.10	0	0	0	0	0	2.47			57
♀	79.0	79.0	29.	10.	34.4	10.5	2	0	2	0	2	3.05			58
♀	85.0	84.0	30.	11.	36.7	11.2	0	0	1	2	0	3.35			59
♀	72.0	70.0	32.	11.	34.3	7.75	0	0	2	1	0	2.48			60
♀	76.5	67.5	32.	12.	37.5	10.7	0	0	3	0	1	3.44			61
♀	75.5	71.5	32.	12.	37.5	11.0	0	0	1	2	1	3.53			62
♀	68.5	68.5	29.	11.	38.0	6.05	1	0	0	1	2	1.75			63
♀	75.0	68.0	29.	12.	41.4	7.90	0	0	0	1	0	2.29			64
♀	77.0	72.5	27.	10.	37.0	6.73	0	0	0	1	1	1.81			65
♀	78.0	73.0	34.	12.	35.2	11.0	0	0	1	0	0	3.73			66
♀	81.0	77.0	27.	12.	44.3	10.2	0	1	1	0	0	2.77			67
♀	72.0	68.0	34.	12.	35.2	11.2	0	0	1	1	1	3.83			68
♀	78.5	78.5	28.	10.	35.7	10.1	0	0	1	0	1	2.87			69
♀	72.0	72.0	26.	11.	42.3	6.55	0	0	1	1	0	1.70			70
♀	76.5	74.5	29.	11.	38.0	8.70	0	0	1	0	1	2.52			71
♀	73.5	73.5	30.	12.	40.0	8.45	0	0	1	0	0	2.53			72
♀	72.5	72.5	29.	12.	41.4	10.1	0	0	1	1	0	2.92			73
♀	72.0	64.0	34.	13.	38.3	12.2	0	0	2	0	1	4.15			74
♀	79.0	75.0	30.	10.	33.4	8.50	2	0	1	1	2	2.55			75

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
♀	75.5	67.0	32.	13.	40.6	12.8	0	0	1	1	0	4.10			76	
♀	79.0	79.0	31.	12.	38.6	14.7	0	0	1	1	1	4.60			77	
♀	71.0	71.0	31.	12.	38.6	8.40	0	0	1	1	0	2.60			78	
♀	84.0	84.0	27.	10.	37.1	7.80	0	0	1	0	1	2.10			79	
♀	72.5	72.5	27.	10.	37.1	7.03	0	0	2	0	0	1.90			80	
♀	76.5	74.0	26.	10.	38.5	5.95	0	0	1	1	2	1.55			81	
♀	73.5	73.5	28.	10.	35.7	6.78	0	0	1	0	1	1.90			82	
♀	73.5	73.5	29.	12.	41.4	10.1	0	0	2	0	1	2.95			83	
♀	80.0	80.0	31.	10.	32.3	11.0	0	0	1	1	2	3.40			84	
♀	81.5	79.5	31.	9.	29.0	9.65	0	0	1	0	0	3.00			85	
♀	75.0	67.5	32.	12.	37.4	9.75	0	0	1	0	1	3.13			86	
♀	78.0	74.0	34.	14.	41.0	13.2	0	0	2	1	0	4.51			87	
♀	74.0	70.0	32.	12.	37.4	10.2	1	0	1	0	1	3.30			88	
♀	77.0	64.0	29.	10.	34.5	5.75	0	0	1	1	1	1.67			89	
♀	66.5	63.0	32.	14.	43.7	9.23	0	0	2	0	0	2.95			90	
♀	73.0	73.0	28.	11.	39.3	8.40	0	0	0	1	0	2.35			91	
♀	83.5	79.5	27.	11.	40.7	7.43	0	0	1	1	1	2.00			92	
♀	68.0	63.5	30.	12.	40.0	8.40	0	0	1	1	1	1.90			93	
♀	79.5	76.5	31.	11.	35.5	10.1	2	0	1	1	2	3.30			94	
♀	77.5	67.5	31.	12.	38.6	8.80	1	0	2	1	2	2.73			95	
♀	71.5	71.5	25.	10.	40.0	5.90	1	0	1	1	1	1.47			96	
♀	80.0	80.0	27.	10.	37.1	7.86	2	0	1	1	2	2.12			97	
♀	62.0	62.0	28.	11.	39.3	6.28	0	0	0	1	1	1.75			98	
♀	77.5	77.5	27.	11.	40.7	8.55	0	0	1	0	1	2.31			99	
♀	73.5	70.0	30.	11.	36.7	7.35	0	0	1	0	2	2.20			100	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	72.5	67.0	31.	13.	42.0	6.45	0	0	0	1	2	2.00			101
♀	75.5	73.5	28.	8.	33.3	5.42	0	0	1	1	0	1.30			102
♀	68.0	68.0	27.	10.	37.1	5.92	0	0	1	1	0	1.60			103
♀	81.5	81.5	25.	10.	40.0	5.25	2	0	0	0	2	1.31			104
♀	75.0	75.0	24.	10.	41.7	5.45	1	0	0	0	2	1.31			105
♀	85.0	85.0	20.	7.	35.2	5.00	2	0	0	1	2	0.10			106
♀	75.0	75.0	25.	10.	40.0	5.60	0	0	0	1	0	1.40			107
♀	79.0	79.0	18.	7.	38.9	4.73	0	0	0	0	0	0.85			108
♀	84.0	84.0	19.	9.	42.3	5.26	0	0	0	1	0	0.01			109
♀	72.5	72.5	19.	8.	42.1	5.26	0	0	0	1	1	0.01			110

Locality Eastport I. Q

Seriation of Data

Nuclear Angle.

1	62.0	71.5	73.0	75.0	76.0	78.0	80.0
2	65.0	71.5	73.0	75.0	76.0	78.0	80.0
3	65.5	71.5	73.0	75.0	76.0	78.5	81.0
4	66.5	71.5	73.5	75.0	76.5	79.0	81.0
5	68.0	72.0	73.5	75.0	76.5	79.0	81.5
6	68.0	72.0	73.5	75.0	76.5	79.0	81.5
7	68.5	72.0	73.5	75.0	76.5	79.0	82.5
8	70.0	72.0	73.5	75.0	76.5	79.0	83.5
9	70.0	72.5	73.5	75.0	77.0	79.0	84.0
10	70.5	72.5	73.5	75.0	77.0	79.0	84.0
11	70.5	72.5	73.5	75.5	77.5	79.5	85.0
12	71.0	72.5	74.0	75.5	77.5	79.5	
13	71.0	72.5	74.0	75.5	77.5	79.5	
14	71.0	72.5	74.5	75.5	77.5	80.0	
15	71.5	72.5	74.5	75.5	77.5	80.0	
16	71.5	73.0	74.5	76.0	78.0	80.0	
Classes	58.0-62.5 (60.3)		63.0-67.5 (65.3)	68.0-72.5 (70.3)	73.0-77.5 (75.3)	78.0-82.5 (80.3)	83.0-87.5 (85.3)
Frequency	1		3	26	48	24	5

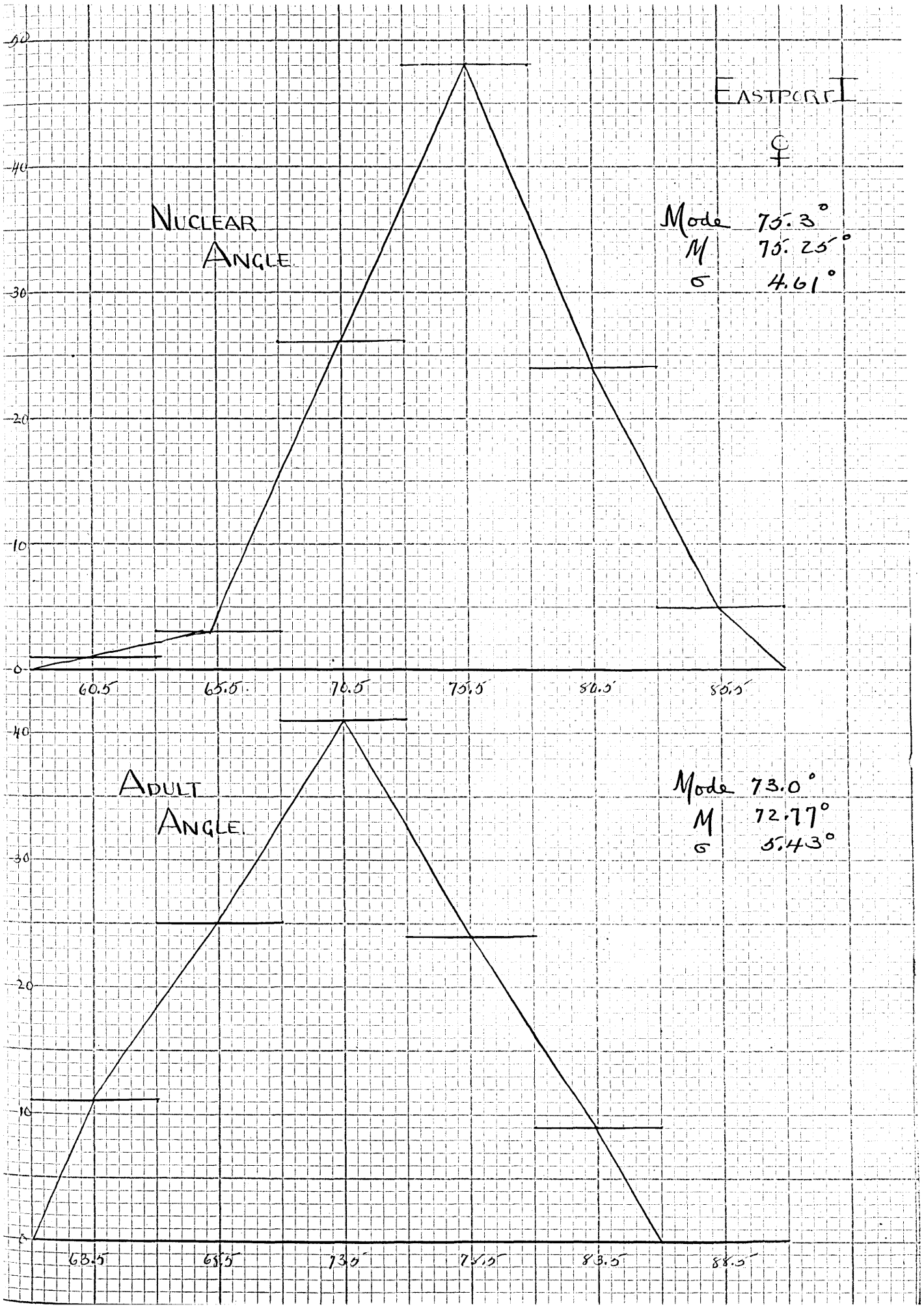
Locality. Eastport I Q

Seriation of Data

Adult Angle

1	60.5	67.0	69.0	71.5	73.5	74.5	76.5	79.0
2	61.5	67.0	69.0	71.5	73.5	75.0	76.5	79.0
3	62.0	67.0	69.5	71.5	73.5	75.0	76.5	79.5
4	62.0	67.0	70.0	71.5	73.5	75.0	77.0	79.5
5	63.0	67.5	70.0	72.0	73.5	76.0	77.5	80.0
6	63.5	67.5	70.0	72.5	73.5	75.0	77.5	80.0
7	63.5	67.5	70.0	72.5	73.5	75.0	78.0	80.0
8	64.0	67.5	70.0	72.5	73.5	75.5	78.0	81.5
9	64.0	67.5	70.5	72.5	73.5	75.5	78.0	84.0
10	65.0	68.0	70.5	72.5	74.0	75.5	78.5	84.0
11	65.0	68.0	71.0	73.0	74.0	76.0	78.5	84.0
12	65.5	68.0	71.0	73.0	74.0	76.0	79.0	85.0
13	66.0	68.0	71.0	73.0	74.0	76.0	79.0	
14	66.5	68.5	71.0	73.0	74.5	76.0	79.0	

Classes	61.0 - 65.0	66.0 - 70.0	71.0 - 75.0	76.0 - 80.0	81.0 - 85.0
	63.0	68.0	73.0	78.0	83.0
Frequency	11	25	41	24	9


EASTPORT
NUCLEAR ANGLE
Mode 75.3°
M 75.25°
σ 4.61°
50
40
30
20
10
0
60.5
65.5
70.5
75.5
80.5
85.5
ADULT ANGLE
Mode 73.0°
M 72.77°
σ 5.43°
40
30
20
10
0
68.5
63.5
73.0
78.5
83.5
88.5

Locality. Eastport-I 9

Seriation of Data.

Ratio between total and partial length

1	29.0	34.5	37.1	38.0	39.3	40.7	42.4
2	31.2	35.2	37.1	38.0	39.3	40.7	42.4
3	32.2	35.2	37.3	38.0	39.3	40.8	42.4
4	32.3	35.2	37.3	38.0	39.3	41.0	43.3
5	33.3	35.5	~~37~~.3	38.3	39.3	41.4	43.6
6	33.3	35.7	37.4	38.3	39.3	41.4	43.7
7	33.4	35.7	37.4	38.3	40.0	41.4	43.7
8	33.4	35.7	37.4	38.5	40.0	41.6	43.7
9	33.4	36.6	37.5	38.5	40.0	41.7	43.7
10	~~33~~.4	36.6	37.5	38.6	40.0	42.0	43.7
11	33.4	36.7	37.5	38.6	40.0	42.0	43.7
12	33.8	36.7	37.5	38.6	40.0	42.0	44.3
13	34.2	36.8	37.5	38.6	40.5	42.1	45.4
14	34.3	37.0	37.8	38.6	40.5	42.3	45.4
15	34.4	37.1	37.8	~~38.6~~	40.5	42.3	46.4
16	34.5	37.1	38.0	38.9	40.6	42.3	
	Classes	29.0–32.9	33.0–36.9	37.0–40.9	41.0–44.9	45.0–48.9	
		31.0	35.0	39.0	43.0	47.0	
	Frequency	4	25	53	25	3	

EASTPORT I

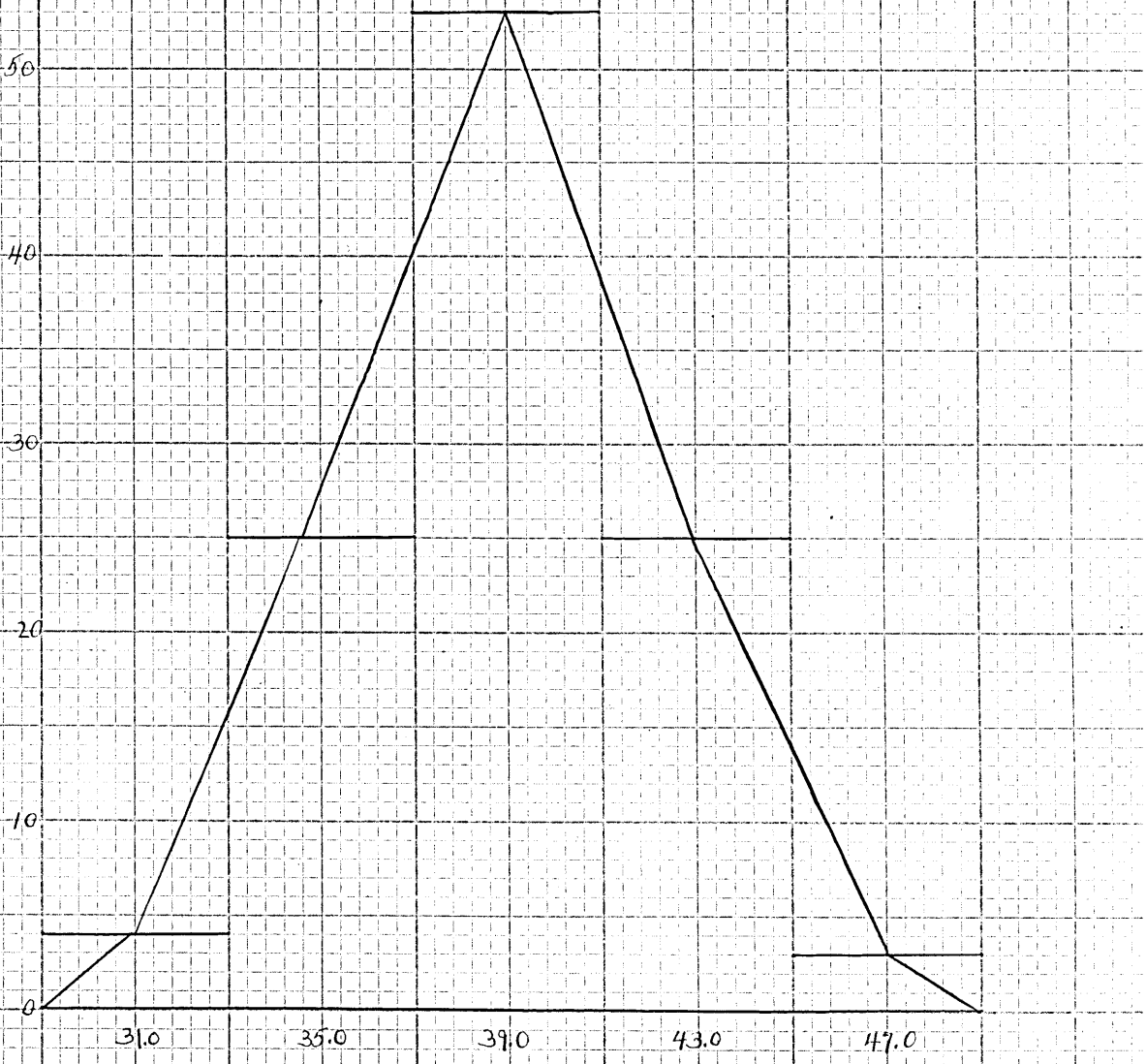
♀

SHAPE RATIO.

Mode 39 %

μ 38.93 %

σ 3.37 %.



Eastlick I 9

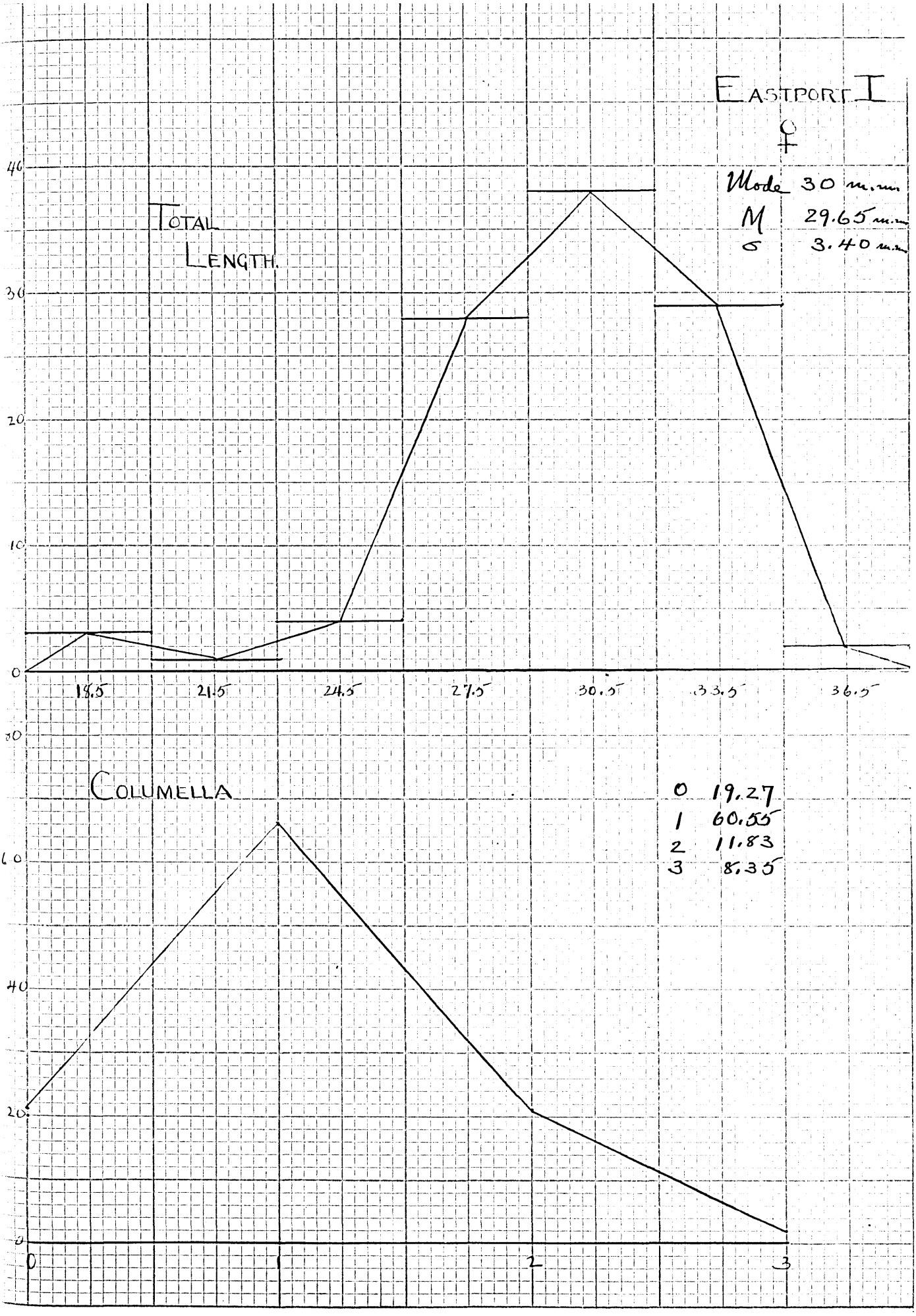
E

Total length

Seriation Data

1	18	27	29	30	31	32	35	
2	19	27	29	30	31	32	36	
3	19	27	29	30	32	32		
4	20	27	29	30	32	32		
5	24	27	29	30	32	32		
6	25	27	29	30	32	~~33~~ 32.5		
7	25	27	29	30	32	~~2~~ 33		
8	25	27	29	30.5	32	~~F~~ 33		
9	26	28	29	31	32	33		
10	26	28	29	31	32	33		
11	26	28	29	31	32	33		
12	26	28	29	31	32	33		
13	26	28	29.5	31	32	33		
14	27	28	30	31	32	34		
15	27	28	30	31	32	34		
16	27	28	20	31	32	34		
17	27	28	30	31	32	34		
18	27	28	30	31	32	34		

Classes	17-19	20-22	23-25	26-28	29-31	32-34	35-37
	18	21	24	27	30	33	36
Frequency	3	1	4	28	38	34	2


EASTPORT I
♀
Mode 30 m.m.
M 29.65 m.m.
σ 3.40 m.m.
TOTAL LENGTH.
40
30
20
10
0
18.5
21.5
24.5
27.5
30.5
33.5
36.5
COLUMELLA
0 19.27
1 60.55
2 11.83
3 8.35
60
40
20
0
0
1
2
3

Locality: Eastport-I Q

Seriation of Data

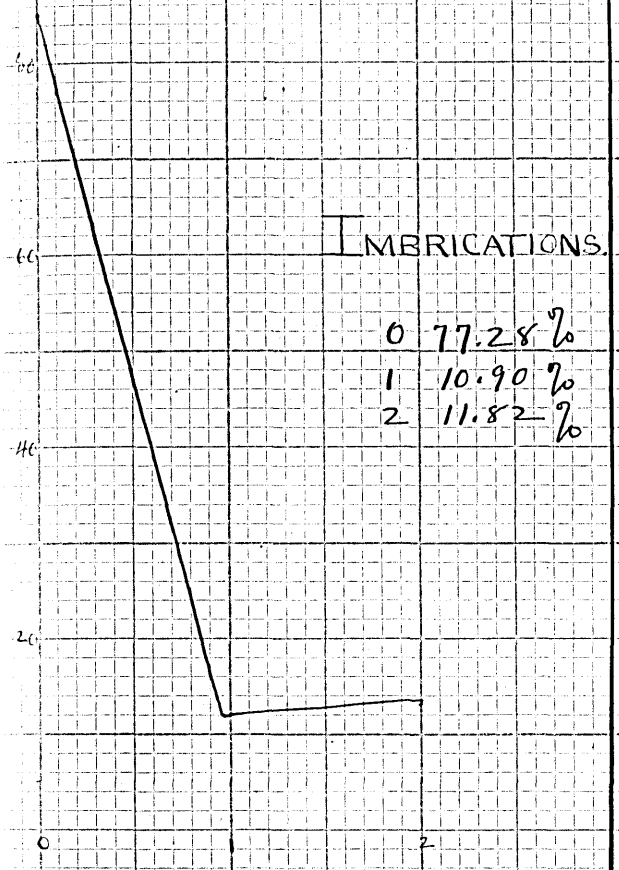
Characters

Imbrications	Classes	0	1	2	
	Frequency	85	12	13	
Teeth	Classes	0	1	2	
	Frequency	109	1	0	
Columella	Classes	0	1	2	3
	Frequency	21	66	21	1
Sutures	Classes	0	1	2	
	Frequency	59	58	1	
Ribs	Classes	0	1	2	
	Frequency	49	38	23	

EASTPORT I
♀

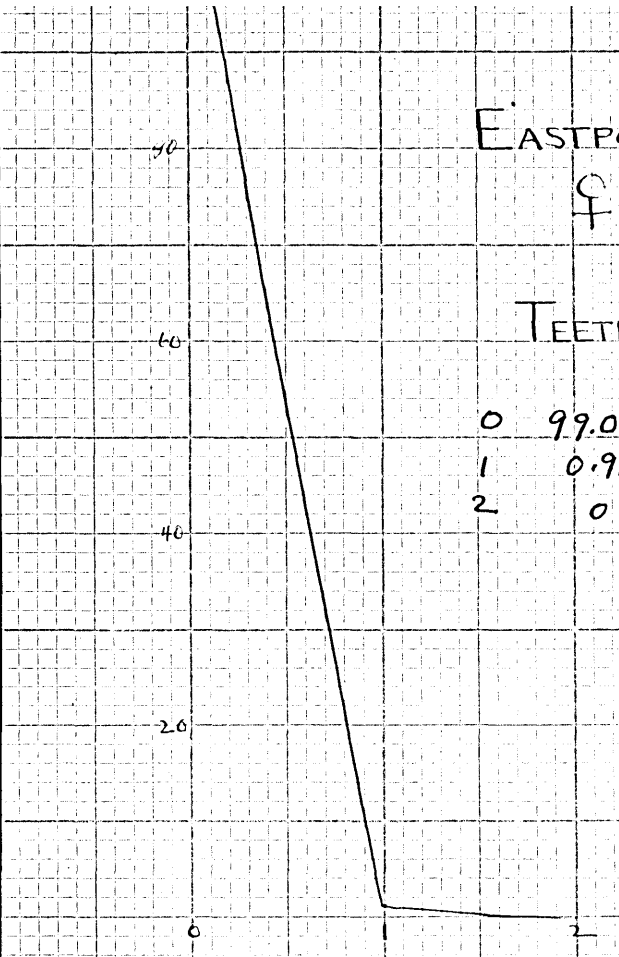
IMBRICATIONS.

0	77.28 %
1	10.90 %
2	11.82 %



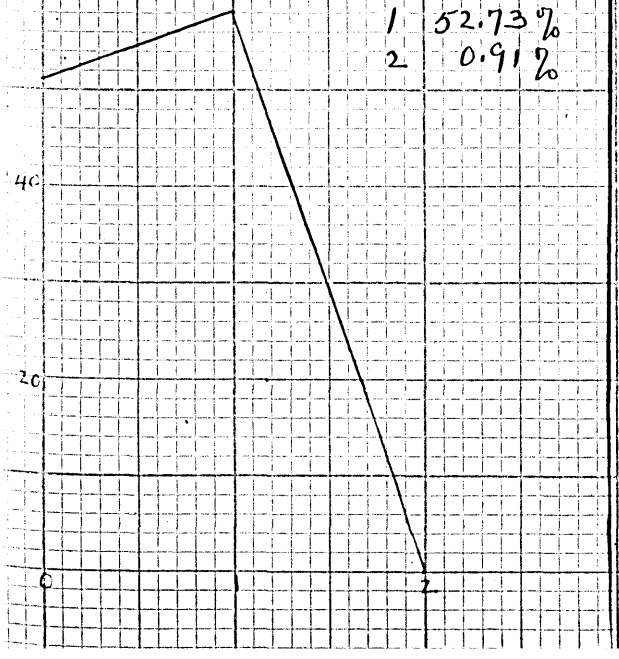
TEETH

0	99.09 %
1	0.91 %
2	0 %



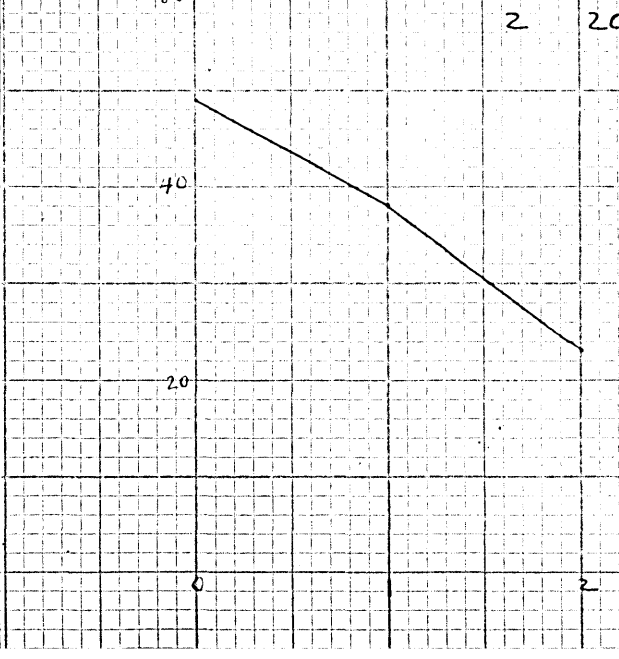
SUTURES.

0	46.36 %
1	52.73 %
2	0.91 %



RIBS.

0	44.55 %
1	34.55 %
2	20.90 %



COLLECTION NO. 3.

MALE SHELLS FROM EASTPORT II.

189 SPECIMENS.

EASTPORT II. Males.

Collection made Monday, December 5, at 5 P. M. on the mainland opposite Clark's Ledge, Eastport, Me.

Position is exposed to the full sweep of the tide which at this point runs swiftly. The shells were gathered from the jutting rocks which completely invest the shore at this point. The food supply is very abundant on account of the proximity of several sardine factories. These places pour oil and fishy matter onto the shore to such an extent that the shells have the peculiar odor which accompanies American sardines, and the rock-weed fairly reeks with it. There can be little doubt that Purpura feed on such material*. Rock-weed is abundant.

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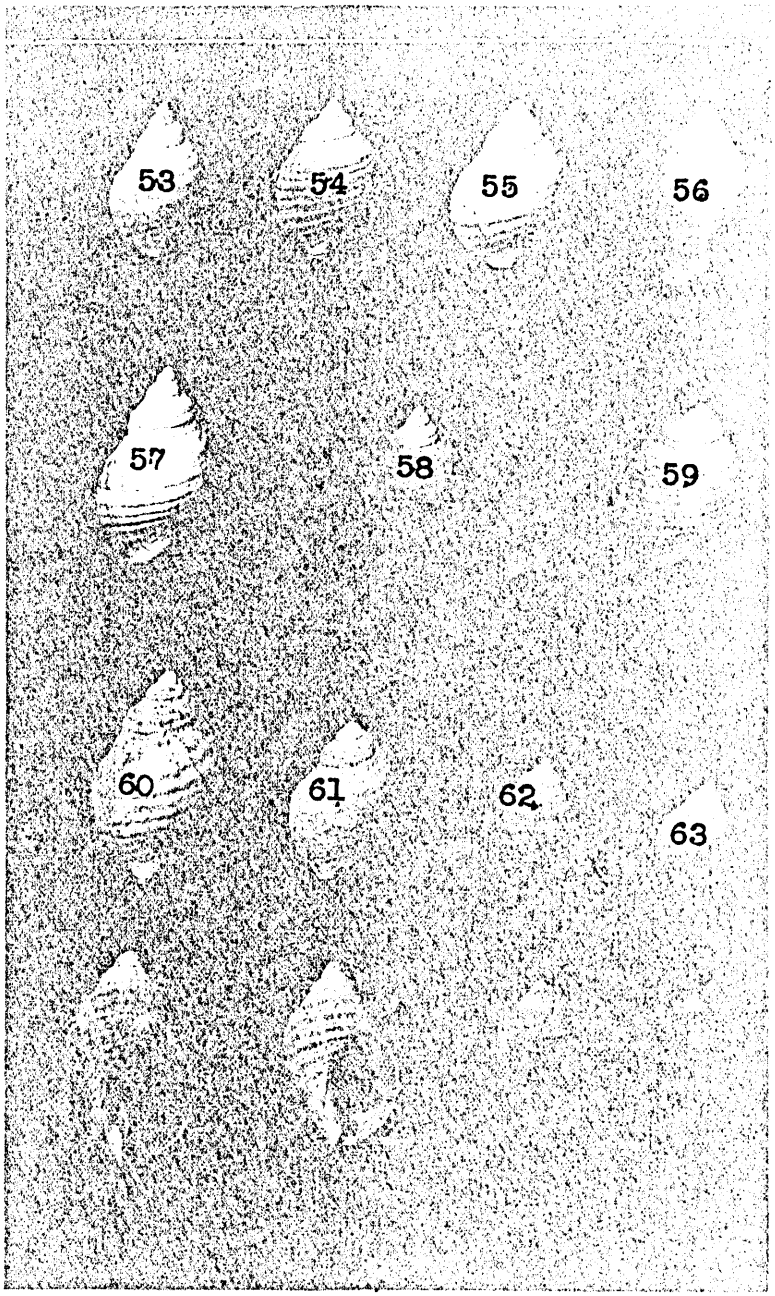
* "The carrion-eating whelks (Buccinum, Purpura, Murex) consume the fishes and other creatures, whose remains are always plentiful on rough and rocky coasts." Tryon.

PLATE VIII.

EASTPORT II. Males.

Figs.	53-56	Nuclear Angle.
"	53, 57-59	Adult "
"	60-63	Total Length.


53
54
55
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58
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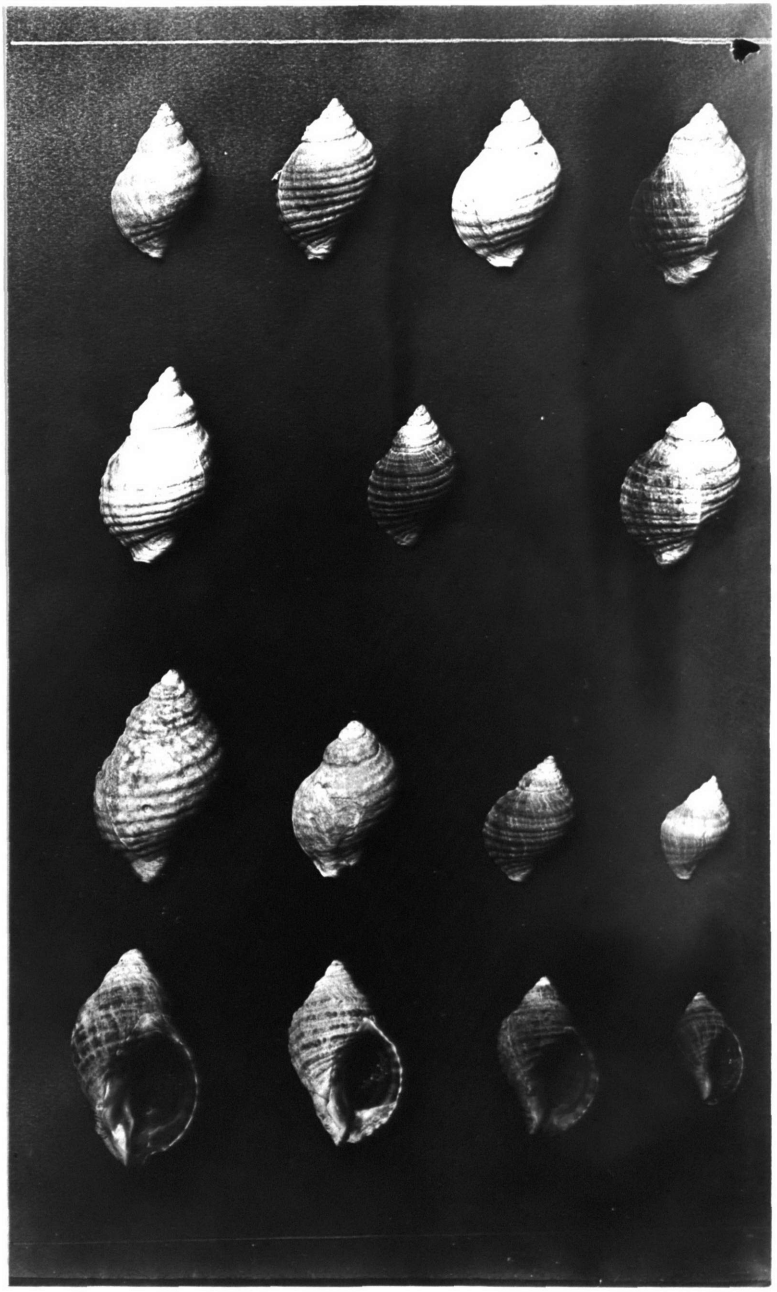
61
62
63



Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight	No.
θ	80.0	76.0	28.	10.	35.7	7.87	0	0	1	0	1	2.20	1
θ	71.5	66.0	27.	10.	37.2	6.11	0	0	1	1	1	1.65	2
θ	81.5	81.5	27.	11.	40.7	6.68	0	0	1	0	1	1.80	3
θ	80.5	75.5	26.	9.	34.7	6.69	0	0	1	0	0	1.74	4
θ	80.0	77.5	24.	10.	41.7	4.80	1	0	1	0	2	1.15	5
θ	68.5	68.5	26.5	12.	45.2	4.53	2	0	1	1	2	1.20	6
θ	68.5	68.5	27.	10.	37.2	3.72	2	0	0	1	2	1.00	7
θ	78.5	68.0	28.	11.	39.3	6.26	1	0	1	1	2	1.75	8
θ	67.0	67.0	22.	10.	45.5	3.18	0	0	1	1	1	0.70	9
θ	66.0	66.0	27.	10.	37.2	6.11	0	0	0	1	0	1.65	10
θ	76.0	73.0	26.	10.	38.6	6.35	0	0	2	0	1	1.65	11
θ	83.0	83.0	25.	9.	36.0	6.62	0	0	1	0	0	1.65	12
θ	73.5	66.5	31.5	12.5	39.6	8.11	1	0	0	1	2	2.55	13
θ	78.0	78.0	27.	9.	33.3	6.50	0	0	2	0	0	1.75	14
θ	78.0	78.0	26.5	9.	34.0	5.93	0	0	1	1	1	1.57	15
θ	82.5	82.5	25.	10.	40.0	5.20	0	0	1	0	0	1.30	16
θ	70.5	68.0	30.	13.	43.3	7.68	0	0	1	1	1	2.30	17
θ	80.5	70.5	29.	11.	38.0	7.60	0	0	1	0	1	2.20	18
θ	70.0	70.0	24.	10.	41.7	7.92	0	0	1	1	0	1.90	19
θ	72.5	72.5	25.5	10.5	41.2	5.29	0	0	1	0	0	1.25	20
θ	70.0	65.0	25.	10.	40.0	3.60	0	0	1	1	0	0.90	21
θ	79.0	79.0	24.5	10.	40.9	4.57	0	0	1	1	2	1.12	22
θ	80.0	75.0	27.	9.	33.3	6.42	0	0	1	0	1	1.73	23
θ	82.5	79.0	28.	10.	35.7	6.96	0	0	0	1	0	1.95	24
θ	75.5	71.5	29.	11.5	39.7	8.11	1	0	2	1	1	2.35	25

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	75.0	75.0	25.	9.	35.9	5.80	1	0	0	0	1	1.45			26
θ	----	75.5	24.	9.	37.6	5.41	0	0	1	1	0	1.30			27
θ	77.0	67.0	31.	11.5	37.1	7.32	0	0	0	1	0	2.27			28
θ	83.0	76.0	24.5	9.	36.8	5.42	0	0	2	0	0	1.33			29
θ	79.0	73.5	21.	9.	42.8	3.33	0	0	1	0	0	0.70			30
θ	82.0	76.5	28.	10.	35.7	6.42	0	0	1	0	0	1.80			31
θ	74.0	74.0	26.	9.5	36.6	5.25	0	0	1	1	1	1.37			32
θ	79.0	71.5	22.	9.	40.9	4.10	2	0	1	0	1	0.90			33
θ	77.0	70.5	27.	10.	37.2	3.88	0	0	0	1	0	1.05			34
θ	84.0	72.0	28.	11.5	41.1	6.42	0	0	1	0	1	1.80			35
θ	75.0	75.0	24.	9.	37.6	4.70	0	0	1	0	0	1.13			36
θ	74.0	67.5	24.	9.	37.6	3.88	0	0	1	0	1	0.93			37
θ	68.0	65.0	26.	10.	38.4	4.45	0	0	1	1	0	1.16			38
θ	81.0	81.0	24.	9.	37.6	4.83	0	0	1	1	0	1.16			39
θ	78.5	78.5	29.5	10.	34.0	7.86	0	0	1	1	1	2.32			40
θ	78.0	71.5	24.	9.	37.6	4.38	0	0	0	1	0	1.05			41
θ	73.0	73.0	26.	9.	34.7	4.92	0	0	1	0	1	1.28			42
θ	79.0	79.0	23.	9.	39.3	3.70	0	0	1	0	0	0.85			43
θ	75.0	69.5	25.	9.	36.0	5.20	1	0	1	1	1	1.30			44
θ	77.0	67.0	27.	9.	33.3	6.20	0	0	1	0	1	1.67			45
θ	70.5	67.0	27.	10.	37.2	4.34	0	0	1	0	1	1.17			46
θ	75.0	70.5	27.	9.	33.3	5.50	0	0	1	0	1	1.49			47
θ	76.0	71.5	28.	11.	39.3	7.70	0	0	1	1	0	2.15			48
θ	----	82.0	26.5	9.	34.0	6.65	1	0	1	1	2	1.76			49
θ	85.0	78.0	23.	8.5	35.8	4.87	0	0	1	0	0	1.12			50

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	----	73.0	23.	10.	43.5	3.48	0	0	0	1	0	0.80			51
θ	68.5	64.0	24.	10.	41.7	3.97	1	0	1	1	1	0.95			52
θ	79.0	79.0	24.	9.	37.6	3.97	1	0	1	1	0	0.95			53
θ	73.0	68.5	23.	8.	34.8	3.70	0	0	0	0	0	0.85			54
θ	80.0	80.0	23.	6.	26.2	5.30	2	0	0	0	1	1.22			55
θ	73.0	73.0	22.	9.	41.0	3.87	0	0	0	1	1	0.85			56
θ	80.0	80.0	22.	9.	41.0	4.19	0	0	1	1	0	0.92			57
θ	78.0	78.0	26.	9.	34.7	5.75	0	0	1	0	0	1.50			58
θ	69.0	69.0	27.	11.	40.7	4.93	0	0	1	1	1	1.33			59
θ	79.0	75.0	31.	11.	35.4	8.98	0	0	1	1	0	2.78			60
θ	80.0	75.0	27.	10.5	38.8	8.19	1	0	0	1	0	2.21			61
θ	75.0	75.0	24.	9.5	39.7	4.17	2	0	1	1	2	1.00			62
θ	72.5	72.5	25.	9.	36.0	4.87	0	0	1	1	0	1.22			63
θ	73.0	70.5	31.	12.	38.7	6.45	0	0	1	0	1	2.00			64
θ	70.5	61.0	32.	13.	40.7	7.29	0	0	0	1	2	2.33			65
θ	72.5	64.0	29.	11.5	39.6	6.22	0	0	1	1	0	1.81			66
θ	65.0	57.0	30.5	12.5	40.9	6.22	0	0	1	1	0	1.90			67
θ	77.0	71.5	26.5	10.	37.8	6.05	2	0	0	1	2	1.60			68
θ	79.0	74.0	27.	9.	33.3	5.93	0	0	1	0	1	1.60			69
θ	75.5	71.0	25.	8.	32.0	5.51	0	0	2	1	0	1.38			70
θ	78.0	75.5	29.	11.5	39.7	5.78	0	0	1	1	0	1.67			71
θ	72.0	67.5	26.	10.	38.6	5.61	0	0	0	1	0	1.46			72
θ	85.5	77.0	26.	10.	38.6	6.73	0	0	1	1	1	1.75			73
θ	71.0	71.0	26.	10.	38.6	6.73	0	0	1	0	2	1.75			74
θ	71.0	65.0	27.	10.	37.2	5.68	0	0	1	0	0	1.53			75

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	80.5	80.5	26.5	8.	30.3	5.96	0	0	2	1	0	1.58			76
θ	70.5	70.5	23.	10.	43.6	3.18	1	0	0	1	1	0.73			77
θ	74.0	70.0	26.	10.	38.5	5.59	0	0	0	1	0	1.45			78
θ	70.0	67.5	29.	11.	38.0	7.12	0	0	1	1	0	2.07			79
θ	78.5	70.0	25.	9.	36.0	5.08	0	0	1	1	0	1.27			80
θ	76.5	68.0	24.	9.	37.6	2.08	0	0	1	1	0	0.50			81
θ	75.0	70.0	28.	11.	39.3	5.79	1	0	1	0	1	1.62			82
θ	79.0	79.0	27.	10.	37.0	6.41	0	0	0	0	1	1.83			83
θ	78.0	78.0	23.	9.	39.2	5.00	0	0	0	0	0	1.15			84
θ	----	77.0	25.	9.	36.0	4.60	0	0	0	0	0	1.15			85
θ	77.0	77.0	23.	9.	39.2	3.92	1	0	1	1	1	0.90			86
θ	----	74.0	25.	10.5	42.1	7.21	2	0	1	1	1	1.80			87
θ	70.5	70.5	23.	10.	43.6	3.26	0	0	1	1	2	0.75			88
θ	----	80.5	21.5	6.5	29.2	3.38	1	0	1	1	1	0.75			89
θ	77.0	77.0	21.5	6.5	29.2	4.34	0	0	1	0	0	0.93			90
θ	71.5	68.0	23.	10.	43.6	3.20	0	0	0	1	1	0.77			91
θ	75.0	75.0	24.	10.	41.7	2.08	0	0	1	1	1	0.50			92
θ	76.5	76.5	22.	8.	36.3	4.18	0	0	1	0	1	0.92			93
θ	73.0	71.0	28.	10.5	37.5	6.85	1	0	1	1	2	1.85			94
θ	79.0	68.0	24.	8.	33.3	4.58	1	0	1	1	1	1.10			95
θ	78.0	78.0	23.	8.	34.8	4.73	0	0	2	1	0	1.09			96
θ	76.5	73.5	25.5	9.	35.3	6.12	0	0	2	0	0	1.56			97
θ	----	64.0	22.5	8.	35.6	3.03	0	0	1	1	0	0.68			98
θ	76.5	76.5	22.	8.	36.3	3.87	0	0	1	1	1	0.85			99
θ	82.0	82.0	23.	9.	39.2	4.66	0	0	0	0	1	1.07			100

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	75.0	75.0	24.	8.	33.4	4.79	0	0	1	1	1	1.15			101
θ	83.0	79.0	26.	9.	34.7	6.00	0	0	1	0	0	1.56			102
θ	75.0	68.0	22.	8.	36.3	4.33	0	0	1	2	0	0.95			103
θ	75.0	75.0	24.	9.	37.6	4.17	0	0	1	0	1	1.00			104
θ	74.5	70.0	23.5	8.	34.1	4.25	0	0	1	1	1	1.00			105
θ	----	64.0	27.	11.	40.8	4.93	0	0	1	0	0	1.33			106
θ	86.5	86.5	28.	10.	35.8	6.61	0	0	1	1	0	1.85			107
θ	79.5	79.5	26.	9.	34.7	6.78	0	0	0	1	1	1.76			108
θ	70.0	64.0	28.	12.	46.4	5.53	0	0	0	1	0	1.55			109
θ	----	81.5	21.5	8.	37.3	3.43	0	0	0	0	2	0.77			110
θ	83.0	83.0	26.5	10.	37.8	6.61	0	0	1	0	0	1.75			111
θ	77.0	77.0	22.	7.	31.9	4.73	0	0	0	0	1	1.04			112
θ	66.5	64.0	27.	11.	40.8	6.18	0	0	1	1	0	1.67			113
θ	65.0	65.0	24.	11.	45.8	3.88	0	0	1	1	0	0.93			114
θ	70.0	63.5	24.	10.	41.8	4.17	0	0	1	1	0	1.00			115
θ	75.5	75.5	20.	7.	35.0	3.35	0	0	0	0	0	0.67			116
θ	75.0	75.0	27.	10.	37.1	6.58	1	0	0	1	1	1.77			117
θ	79.0	73.0	27.	9.	33.3	5.75	1	0	0	0	0	1.55			118
θ	75.0	67.5	25.	10.	40.0	5.00	1	0	1	1	2	1.25			119
θ	77.5	73.5	25.5	10.	39.2	5.88	1	0	1	1	2	1.50			120
θ	84.0	78.5	28.	9.5	34.0	6.80	1	0	2	1	1	1.90			121
θ	70.5	63.5	29.	11.	38.0	6.39	0	0	1	1	0	1.85			122
θ	70.0	70.0	26.	10.5	40.4	5.19	1	0	0	1	2	1.35			123
θ	80.5	76.0	26.5	8.5	32.2	7.20	0	0	1	0	0	1.90			124
θ	73.0	73.0	25.	9.	36.0	5.80	2	0	1	1	2	1.45			125

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	73.0	73.0	27.	10.	37.1	6.40	0	0	1	1	0	1.73			126
θ	72.0	72.0	26.	10.	38.5	5.50	0	0	1	0	0	1.43			127
θ	74.0	70.0	23.	10.	43.6	4.94	0	0	0	0	0	1.14			128
θ	----	71.1	22.	9.5	43.3	3.97	0	0	1	1	1	0.87			129
θ	----	66.5	24.	10.	41.7	3.33	0	0	1	1	0	0.80			130
θ	73.5	69.0	28.	10.	35.7	5.11	0	0	2	0	0	1.43			131
θ	75.0	75.0	24.	9.	37.6	4.58	0	0	1	1	0	1.10			132
θ	81.5	78.5	24.	9.	37.6	4.58	1	0	0	1	1	1.10			133
θ	80.0	77.5	23.	8.	34.8	5.22	0	0	1	0	1	1.20			134
θ	----	80.0	26.	8.5	32.7	6.36	0	0	0	1	2	1.65			135
θ	79.0	72.5	23.	9.	39.2	5.42	0	0	1	2	0	1.25			136
θ	72.0	72.0	29.	11.	37.9	6.39	2	0	1	1	2	1.85			137
θ	72.5	72.5	28.	10.	35.7	5.00	0	0	1	0	0	1.40			138
θ	80.0	80.0	28.	9.	32.2	6.78	2	0	0	1	2	1.90			139
θ	73.0	73.0	22.	9.	41.0	3.77	1	0	0	0	1	0.83			140
θ	75.0	75.0	30.	11.5	38.3	7.69	0	0	2	0	1	2.30			141
θ	72.5	63.5	31.5	12.5	39.5	7.70	0	0	2	1	1	2.43			142
θ	83.0	76.0	30.	10.	33.3	7.00	0	0	2	1	0	2.10			143
θ	75.0	70.5	32.5	13.	40.0	8.46	0	0	2	1	1	2.75			144
θ	76.5	76.5	29.5	12.	40.7	9.17	0	0	1	1	1	2.70			145
θ	77.0	64.0	32.	13.	40.7	9.21	0	0	1	0	1	2.95			146
θ	----	80.0	20.	7.	35.0	4.30	0	0	1	1	1	0.86			147
θ	----	67.0	23.	9.	39.2	3.44	0	0	1	1	1	0.79			148
θ	73.5	73.5	22.	9.	41.0	3.19	2	0	1	1	2	0.70			149
θ	75.0	70.0	21.5	7.	32.7	3.26	0	0	1	1	2	0.70			150

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	71.5	71.5	21.	8.	38.2	3.10	1	0	0	1	2	0.65			151
θ	----	72.0	22.	7.5	34.2	3.28	0	0	0	0	1	0.72			152
θ	68.0	68.0	21.	7.	33.3	3.00	0	0	1	1	0	0.63			153
θ	70.5	70.5	20.	7.	35.0	2.75	0	0	0	0	1	0.55			154
θ	----	79.0	21.	7.	33.3	3.46	0	0	2	1	1	0.75			155
θ	66.5	66.5	22.	9.	41.0	2.59	0	0	1	0	1	0.57			156
θ	76.5	76.5	19.	7.	37.0	2.96	0	0	1	1	1	0.56			157
θ	76.5	76.5	18.	6.	33.3	3.61	0	0	1	1	2	0.65			158
θ	76.5	76.5	20.	7.	35.0	3.00	1	0	0	1	2	0.60			159
θ	67.0	67.0	21.5	9.	42.0	3.17	2	0	0	1	2	0.68			160
θ	74.5	74.5	21.	7.	33.3	3.48	0	0	0	1	1	0.73			161
θ	----	77.5	20.	7.	35.0	3.00	2	0	0	0	2	0.60			162
θ	75.5	73.0	21.	7.5	35.8	3.48	0	0	0	1	1	0.73			163
θ	67.5	67.5	22.	7.5	34.0	3.00	0	0	0	1	1	0.66			164
θ	73.0	73.0	21.	7.	33.3	3.14	0	0	1	0	1	0.66			165
θ	78.0	78.0	20.5	7.	34.3	4.14	0	0	2	0	1	0.85			166
θ	75.0	75.0	20.	7.5	37.6	3.36	0	0	1	0	1	0.67			167
θ	73.5	73.5	21.5	8.	37.3	3.49	0	0	1	0	0	0.75			168
θ	76.5	76.5	20.	6.	30.0	3.25	0	0	2	0	1	0.65			169
θ	65.5	65.5	22.	9.	41.0	3.28	0	0	0	0	0	0.72			170
θ	73.5	73.5	21.	7.	33.3	3.43	0	0	1	1	0	0.72			171
θ	70.0	70.0	20.	7.	35.0	3.00	0	0	1	0	1	0.60			172
θ	75.5	75.5	20.	8.	40.0	2.80	0	0	0	1	0	0.56			173
θ	----	66.0	21.5	9.	42.0	3.44	0	0	0	2	0	0.74			174
θ	70.0	70.0	21.	9.	42.9	2.96	0	0	1	1	2	0.62			175

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight	No.
θ	72.0	70.0	19.	7.	36.9	2.63	0	0	1	1	0	0.50	176
θ	74.5	74.5	19.	7.	36.9	2.90	0	0	1	1	1	0.55	177
θ	74.5	74.5	18.	8.	44.4	2.67	0	0	1	1	0	0.48	178
θ	----	75.5	20.	8.	40.0	2.90	0	0	0	0	1	0.58	179
θ	76.0	76.0	21.	8.	38.2	2.38	0	0	0	1	0	0.50	180
θ	76.0	76.0	18.	7.	39.0	2.77	0	0	0	1	0	0.50	181
θ	75.0	71.5	19.	7.	36.9	2.63	0	0	1	1	1	0.50	182
θ	72.5	72.5	10.5	7.	46.7	5.23	0	0	1	1	1	0.55	183
θ	72.5	70.0	17.	6.	35.4	1.73	0	0	1	1	0	0.30	184
θ	77.5	77.5	20.5	7.5	35.4	2.44	0	0	0	2	1	0.50	185
θ	76.5	75.0	16.5	6.	36.5	2.13	0	0	0	1	1	0.35	186
θ	74.5	74.5	18.	6.	33.3	1.93	0	0	0	0	0	0.35	187
θ	68.0	68.0	16.5	7.	42.5	1.96	0	0	1	0	0	0.24	188
θ	70.5	70.5	17.5	8.	45.8	1.89	0	0	1	1	2	0.33	189

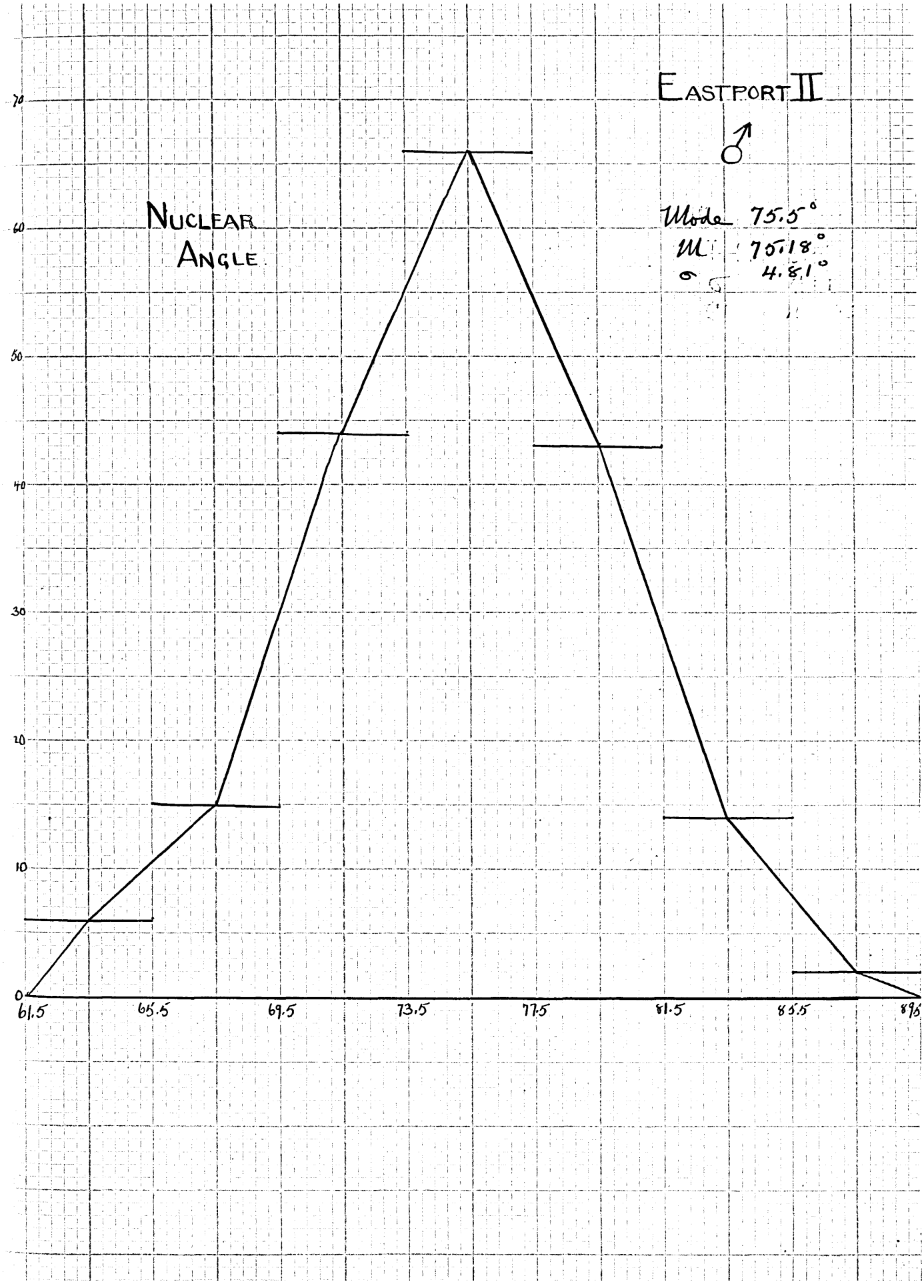
Eastport-II. Males.

Seriation of Data

Nuclear Angle.

1	62	70	72.5	74	75	76.5	78.5	80
2	62	70	72.5	74	75	76.5	78.5	80.5
3	64.5	70	72.5	74	75	77	78.5	80.5
4	65	70	72.5	74	75	77	79	80.5
5	65	70	72.5	74.5	75.5	77	79	80.5
6	65	70	72.5	74.5	75.5	77	79	81
7	65.5	70.5	72.5	74.5	75.5	77	79	81.5
8	66	70.5	73	74.5	75.5	77	79	81.5
9	66.5	70.5	73	74.5	75.5	77	79	82
10	66.5	70.5	73	75	75.5	77	79	82
11	67	70.5	73	75	76	77	79	82.5
12	67	70.5	73	75	76	77.5	79	82.5
13	67.5	70.5	73	75	76	77.5	79	83
14	68	70.5	73	75	76	78	79	83
15	68	71	73	75	76	78	79.5	83
16	68	71	73	75	76	78	79.5	83
17	68.5	71	73	75	76.5	78	80	83
18	68.5	71.5	73.5	75	76.5	78	80	84
19	68.5	71.5	73.5	75	76.5	78	80	84
20	69	71.5	73.5	75	76.5	78	80	85
21	69.1	72	73.5	75	76.5	78	80	85.5
22	70	72	73.5	75	76.5	78	80	86.5
23	70	72	73.5	75	76.5	78	80	
24	70	72.0	73.5	75	76.5	78.5	80	

Classes	61.5-65.4	65.5-69.4	69.5-73.4	73.5-77.4	77.5-81.4	81.5-85.4	85.5-89.4
	63.5	67.5	71.5	75.5	79.5	83.5	87.5
Frequency	6	15	44	66	43	14	2


EASTPORT II
NUCLEAR ANGLE
Mode 75.5°
μ 75.18°
σ 4.81°
70
60
50
40
30
20
10
0
61.5
65.5
69.5
73.5
77.5
81.5
85.5
89.5

B

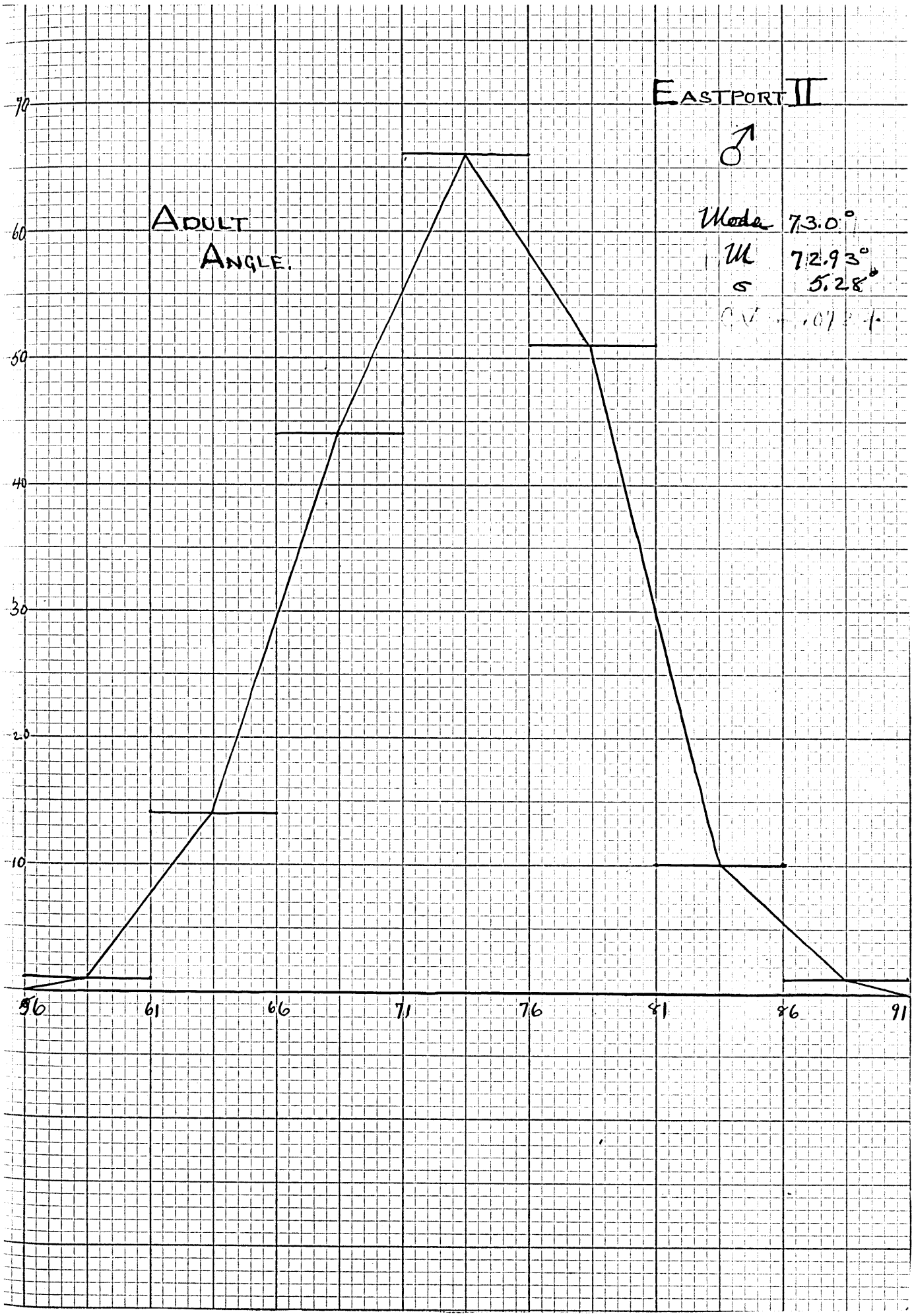
Eastport II ♂

Seriation of Data

Adult Angle

1	57.	66.5	68	70.5	72.	73.5	75	76.5	78.				
2	61.	66.5	68.5	70.5	72	73.5	75	76.5	78.5				
3	63.5	67	68.5	70.5	72	73.5	75	76.5	78.5				
4	63.5	67	68.5	70.5	72.5	73.5	75	76.5	79	81.5			
5	63.5	67	69	70.5	72.5	74	75.5	77	79	81.5			
6	64	67	69	70.5	72.5	74	75.5	77	79	82			
7	64	67	69.5	70.5	72.5	74	75.5	77	79	82			
8	64	67	70	70.5	72.5	74.5	75.5	77	79	82.5			
9	64	67.5	70	71	73	74.5	75.5	77	79	83			
10	64	67.5	70	71	73	74.5	75.5	77.5	79	83			
11	64	67.5	70	71.	73	74.5	75.5	77.5	79.5	86.5			
12	65	67.5	70	71.1	73	75	76	77.5	80				
13	65	67.5	70	71.5	73	75	76	77.5	80				
14	65	68	70	71.5	73	75	76	78	80				
15	65	68	70.	71.5	73	75	76	78	80				
16	65.5	68	70	71.5	73	75	76	78	80.				
17	66	68	70	71.5	73	75	76.5	78	80.5				
18	66	68	70	71.5	73	75	76.5	78	80.5				
19	66	68.	70	71.5	73.5	75	76.5	78	81				
20	66.5	68	70.5	72	73.5	75							

Classes	56.0-60.0	61.0-65.0	66.0-70.0	71.0-75.0	76.0-80.0	81.0-85.0	86.0-90.0
	58.0	63.0	68.0	73.0	78.0	83.0	88.0
Frequency	1	14	44	66	51	10	1


EASTPORT II
♂
ADULT
ANGLE.
Mode 73.0°
μ 72.93°
σ 5.28°
70
60
50
40
30
20
10
56
61
66
71
76
81
86
91

Eastport II ♂

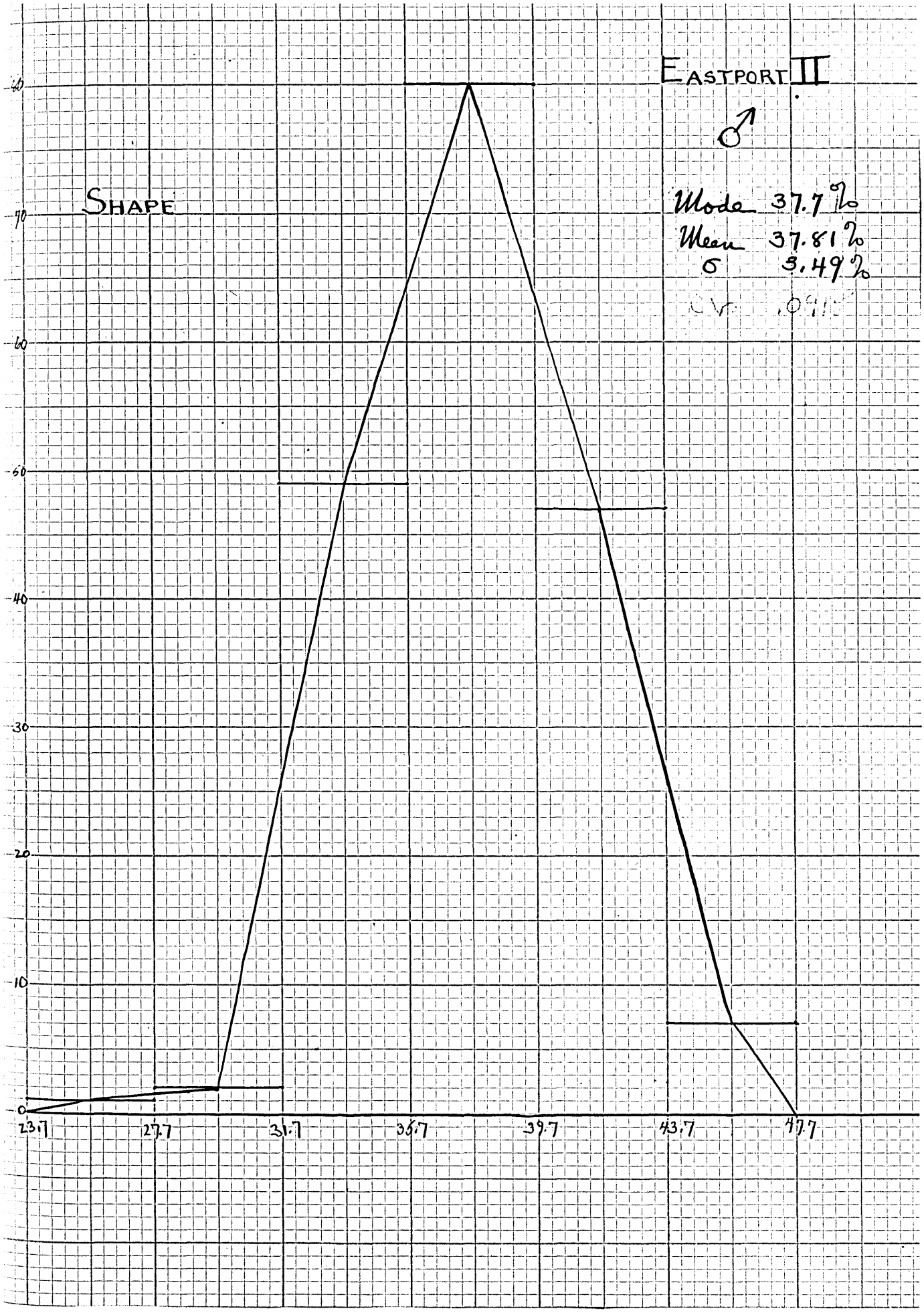
C.

Shape Ratio

Seriation of Data

1	262	333	35	36	372	378	392	407	417	458
2	292	333	35	36	372	378	392	407	417	458
3	30	333	35	36	372	38	392	407	417	464
4	319 32	333	35	36	372	38	393	407	418	467
5	322	334	35	36	372	38	393	407	42	
6	322	34	35	36	372	382	393	408	42	
7	327	34	353	363	373	382	393	408	421	
8	327	34	354	363	373	383	395	409	425	
9	333	34	354	363	375	384	396	409	428	
10	333	34	354	365	376	385	396	409	429	
11	333	341	356	366	376	385	397	41	43	
12	333	342	357	368	376	386	397	44	433	
13	333	343	357	369	376	386	397	41	435	
14	333	347	357	369	376	386	40	41	436	
15	333	347	357	369	376	386	40	41	436	
16	333	347	357	37	376	387	40	41	436	
17	333	347	358	37	376	388	40	41.1	436	
18	333	348	358	371	376	39	40	41.2	444	
19	333	348	358	371	376	392	40	41.7	452	
20	333	348	359	371	376	392	404	417	455	

Classes.	23.7-27.6 (25.7)	27.7-31.6 (29.7)	31.7-35.6 (33.7)	35.7-39.6 (37.7)	39.7-43.6 (41.7)	43.7-47.6 (45.7)
Frequency	1	2	49	80	47	7


EASTPORT II
SHAPE
Mode 37.7%
Mean 37.81%
σ 3.49%
CV .09%
80
70
60
50
40
30
20
10
0
23.7
27.7
31.7
35.7
39.7
43.7
47.7

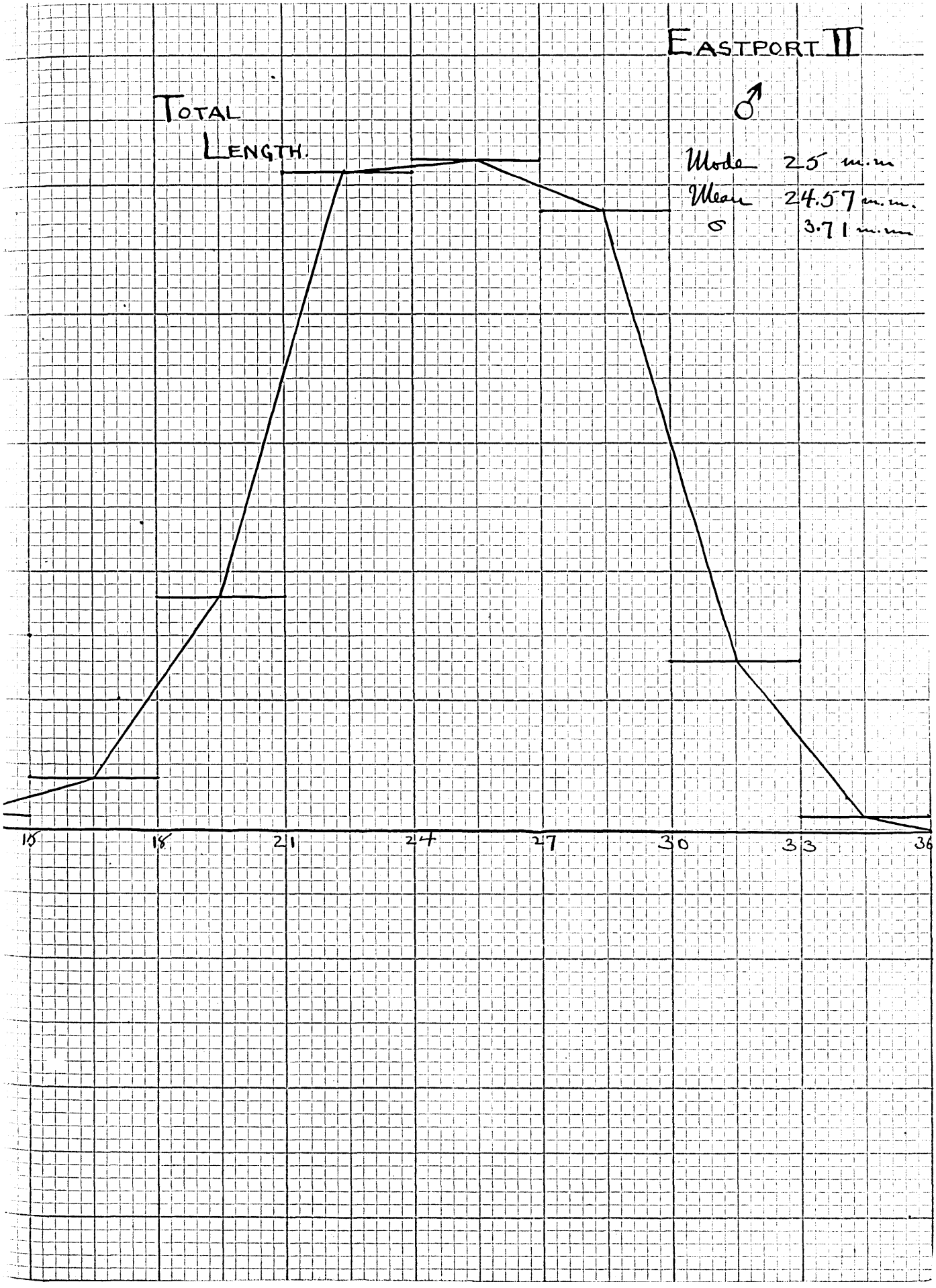
Eastport II ♂

Seriation of Data.

Total Length.

1	10.5	20	21.5	22	23	24	25	26	27	28	30.5
2	16.5	20	21.5	22	23	24	25.5	26.5	27	28	31
3	16.5	20	21.5	22	23.5	24	25.5	26.5	27	28	31
4	17	20	21.5	23.5	24	24	25.5	26.5	27	28	31
5	17	20	21.5	23	24	24	26	26.5	27	28	31.5
6	18	20.5	21.5	23	24	24.5	26	26.5	27	28	31.5
7	18	20.5	22	23	24	24.5	26	26.5	27	29	32
8	18	21	22	23	24	25	26	26.5	27	29	32
9	18	21	22	23	24	25	26	27	27	29	32.5
10	19	21	22	23	24	25	26	27	27	29	
11	19	21	22	23	24	25	26	27	28	29	
12	19	21	22	23	24	25	26	27	28	29	
13	19	21	22	23	24	25	26	27	28	29	
14	20	21	22	23	24	25	26	27	28	29.5	
15	20	21	22	23	24	25	26	27	28	29.5	
16	20	21	22	23	24	25	26	27	28	30	
17	20	21	22	23	24	25	26	27	28	30	
18	20	21.5	22	23	24	25	26	27	28	30	

Classes.	below 15	15-17	18-20	21-23	24-26	27-29	30-32	33-35
	10.5	16	19	22	25	28	31	34
Frequency	1	4	18	51	52	48	13	1


EASTPORT II
♂
TOTAL LENGTH.
Mode 25 m.m.
Mean 24.57 m.m.
σ 3.71 m.m.
15
18
21
24
27
30
33
36

Eastport II Make.

Seriation of Data

Characters

Imbrications

Classes	0	1	2	Total
Frequency	150	26	13	189

Teeth

Classes	0	1	2 ±
Frequency	189	0	0 189

Columella

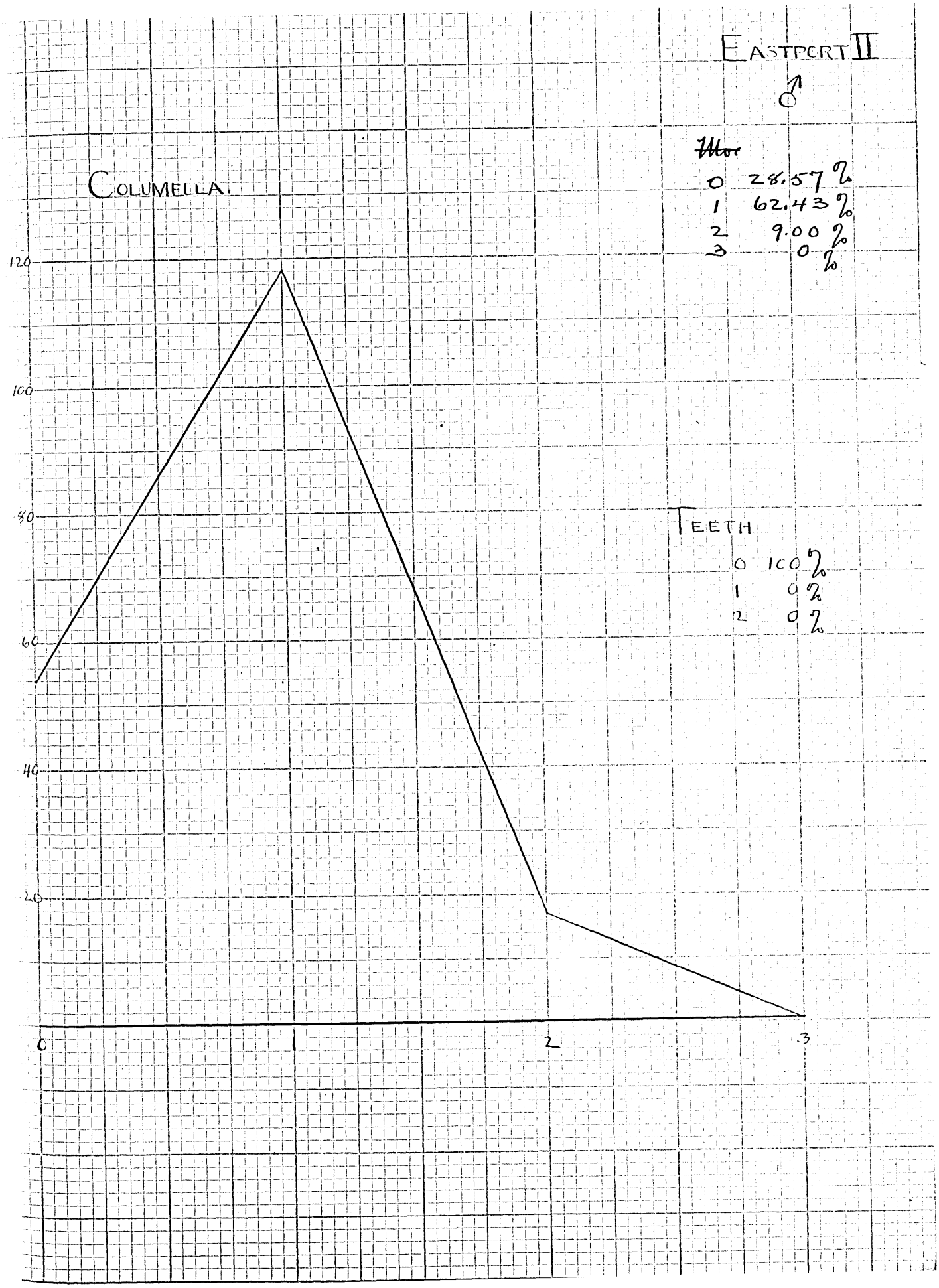
Classes	0	1	2	3
Frequency	54	118	17	0 189

Sutures

Classes	0	1	2
Frequency	71	114	4 189

Ribs

Classes	0	1 ±	2
Frequency	82	77	30 189


EASTPORT II
COLUMELLA.
0 28.57 %
1 62.43 %
2 9.00 %
3 0 %
TEETH
0 100 %
1 0 %
2 0 %
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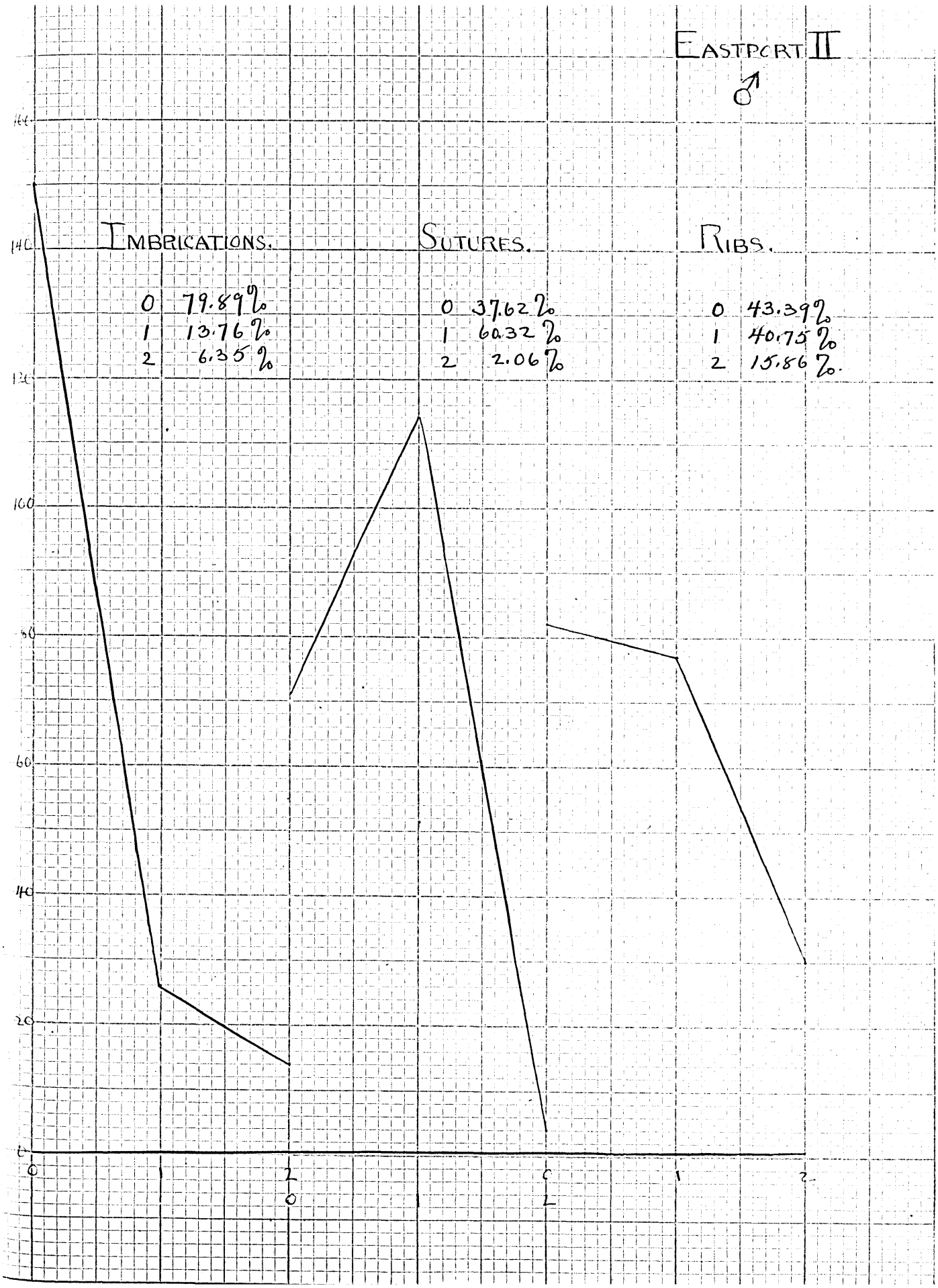
EASTPORT II
♂
EMBRICATIONS.
0 79.89%
1 13.76%
2 6.35%
SUTURES.
0 37.62%
1 60.32%
2 2.06%
RIBS.
0 43.39%
1 40.75%
2 15.86%
140
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COLLECTION NO. 4.

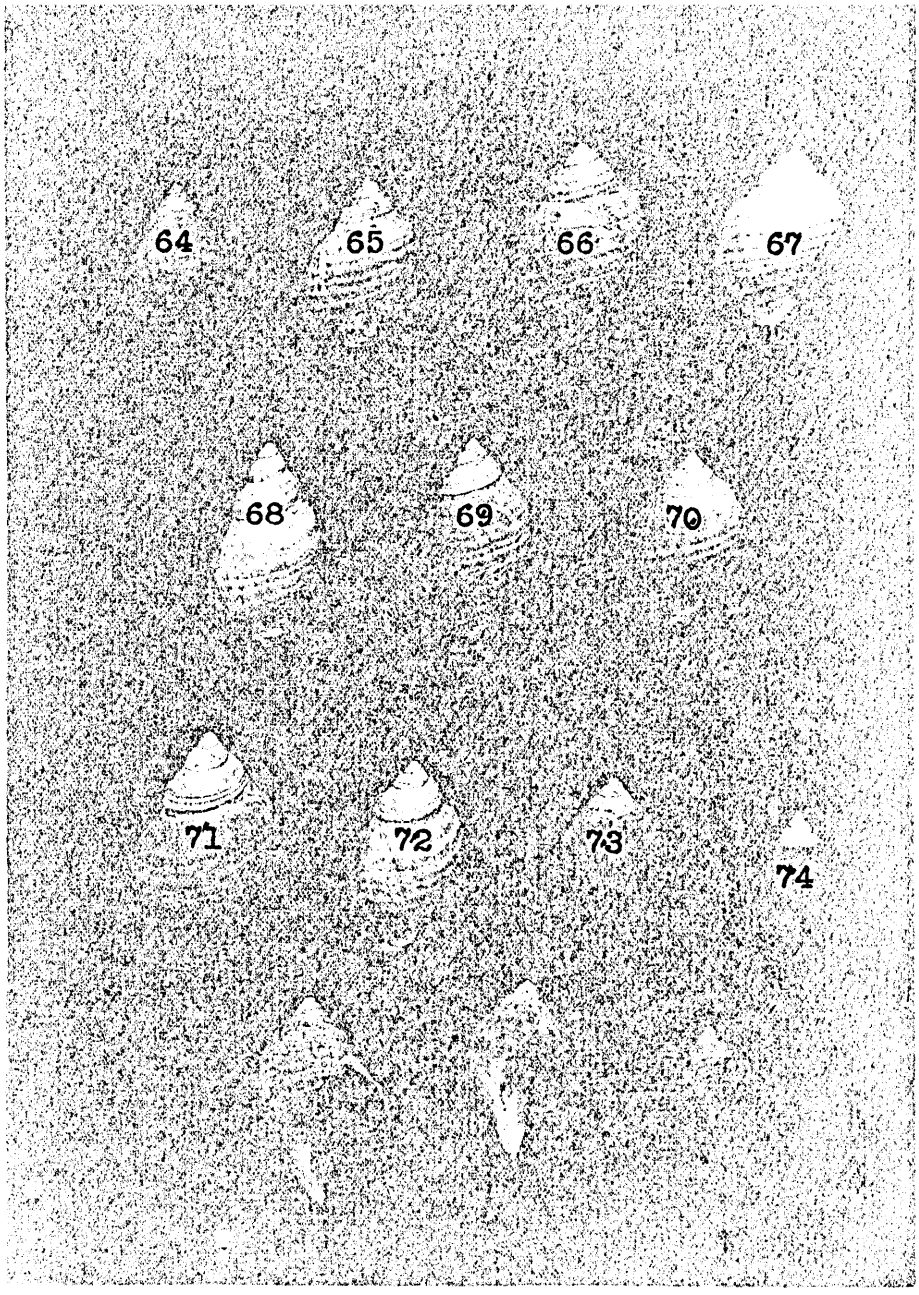
FEMALE SHELLS FROM EASTPORT II.

137 SPECIMENS.

PLATE IX.

EASTPORT II. Females.

Figs.	64-67	Nuclear Angle.
"	68-70	Adult "
"	71-74	Total Length.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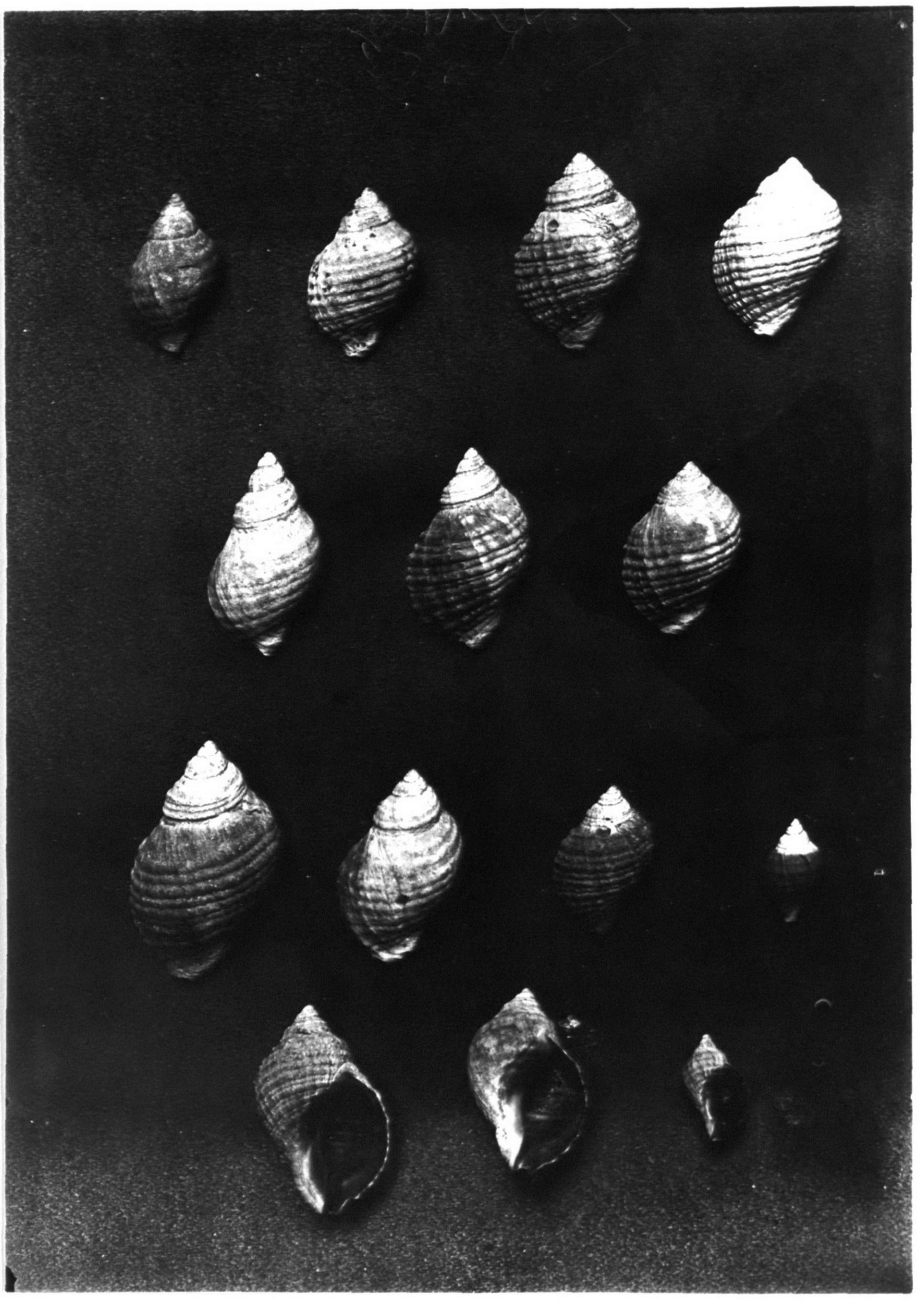


Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	72.0	72.0	30.	10.5	35.0	7.55	0	0	1	1*	1	2.27			1
♀	74.0	72.0	28.5	11.	38.6	8.39	0	0	1	1	1	2.38			2
♀	70.0	66.5	25.5	10.	39.2	6.88	0	0	2	1*	0	1.75			3
♀	87.0	79.0	28.	10.	35.7	8.50	2	0	1	1	2	2.38			4
♀	81.5	75.0	28.	9.	32.2	8.19	1	0	1	1	2	2.29			5
♀	80.0	70.5	31.	12.	38.6	10.4	0	0	0	1	1	3.20			6
♀	75.5	75.5	27.5	10.	36.5	7.73	1	0	1	1	2	2.13			7
♀	80.0	80.0	30.	10.	33.3	9.69	0	0	1	1	1	2.90			8
♀	82.5	72.5	30.	11.	36.7	9.44	2	0	1	1	2	2.83			9
♀	79.0	69.5	27.	9.	33.3	7.90	0	0	1	1	1	2.13			10
♀	74.0	68.0	26.5	10.	37.7	5.89	0	0	1	1	1	1.56			11
♀	75.5	67.0	31.5	12.	38.1	8.90	0	0	0	1	1	2.80			12
♀	79.0	71.0	29.	11.	38.0	9.10	0	0	1	1	1	2.63			13
♀	72.0	66.0	26.5	10.	37.8	6.05	0	0	1	1	0	1.60			14
♀	75.0	72.0	27.	10.	37.1	7.13	0	0	1	0	1	1.92			15
♀	77.5	72.0	27.5	11.	40.0	8.19	0	0	0	0	1	2.33			16
♀	78.0	70.0	27.	10.	36.9	6.94	0	0	1	1	0	1.87			17
♀	76.0	67.0	29.5	11.	37.3	7.43	0	0	0	1*	0	2.19			18
♀	75.0	75.0	26.	10.	38.5	6.48	0	0	1	1	1	1.68			19
♀	73.0	70.0	26.	9.5	36.5	5.39	0	0	0	1	1	1.40			20
♀	76.0	71.5	26.	8.5	32.7	5.95	0	0	1	1	0	1.53			21
♀	83.0	78.0	24.	6.5	27.2	5.96	1	0	1	1	2	1.43			22
♀	74.5	74.5	24.	9.	37.5	4.58	1	0	0	0	1	1.10			23
♀	74.5	73.0	23.	8.	34.8	3.92	0	0	0	0	1	0.90			24
♀	----	73.5	25.	10.	40.0	4.80	0	0	0	2	0	1.20			25

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
♀	80.5	76.0	27.	10.	37.0	7.22	0	0	2	0	1	1.95			26	
♀	77.0	73.5	30.	12.	40.0	8.72	2	0	1	1	2	2.62			27	
♀	84.5	84.5	26.	9.	34.7	8.35	0	0	1	0	2	2.17			28	
♀	80.0	75.0	30.	11.	36.7	10.9	0	0	1	0	1	3.25			29	
♀	79.0	70.0	31.5	11.5	36.5	10.7	0	0	1	1	0	3.35			30	
♀	76.5	74.0	28.	11.	39.3	8.09	0	0	1	1	0	2.18			31	
♀	80.0	70.0	31.	11.	35.5	9.60	0	0	0	0	1	2.97			32	
♀	73.0	70.0	28.	11.	39.3	7.98	0	0	0	1	1	2.23			33	
♀	74.5	57.5	30.	14.	46.6	10.0	0	0	2	2	1	2.99			34	
♀	----	82.5	23.	8.	34.8	6.22	0	0	0	1	1	1.43			35	
♀	78.0	74.0	24.5	8.	32.7	6.04	0	0	1	1	1	1.48			36	
♀	74.0	70.5	25.	10.	40.0	4.80	0	0	2	1	1	1.20			37	
♀	77.0	71.5	27.	10.	37.1	4.37	0	0	1	1	2	1.48			38	
♀	78.0	70.0	27.	10.	37.1	7.80	0	0	1	1	2	2.10			39	
♀	69.5	68.0	28.	12.	42.8	8.08	0	0	0	2	1	2.26			40	
♀	78.0	74.5	26.5	7.5	28.3	6.96	0	0	1	1	1	1.84			41	
♀	76.0	72.0	25.	9.	36.0	5.82	0	0	1	1	0	1.46			42	
♀	78.5	78.5	26.	9.	34.7	6.09	0	0	0	1	2	1.58			43	
♀	82.5	75.5	26.	9.5	36.6	5.76	0	0	0	1	1	1.50			44	
♀	78.5	68.5	30.	11.	36.7	9.34	0	0	1	1	2	2.80			45	
♀	72.5	65.5	30.	11.	36.7	8.35	0	0	1	1	0	2.50			46	
♀	73.0	73.0	28.	10.	35.7	7.90	0	0	1	1	0	2.22			47	
♀	----	83.0	25.	7.	38.1	7.69	1	0	1	0	1	1.92			48	
♀	----	73.5	25.	10.	40.0	4.00	1	0	0	1	2	1.00			49	
♀	77.0	73.0	23.	8.	34.8	4.78	0	0	0	1	2	1.11			50	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
♀	----	76.0	24.	9.5	39.6	5.00	0	0	0	1	1	1.20			51	
♀	83.0	75.5	28.	10.	35.8	7.51	0	0	1	1	1	2.10			52	
♀	78.5	71.5	27.	11.	40.8	6.32	1	0	1	2	2	1.71			53	
♀	76.0	67.0	29.	9.5	32.8	7.60	0	0	1	1	0	2.20			54	
♀	84.0	79.0	27.	9.	33.4	8.65	0	0	1	1	1	2.33			55	
♀	----	82.0	26.5	9.	33.9	8.05	0	0	2	0	2	2.13			56	
♀	----	77.5	29.	10.	34.4	9.20	0	0	1	1	1	2.67			57	
♀	72.5	70.0	27.5	9.	32.8	8.26	0	0	0	1	0	2.27			58	
♀	78.0	75.0	27.	9.	33.3	4.27	0	0	0	1	1	1.15			59	
♀	74.0	74.0	27.	11.	40.9	8.21	0	0	0	1	0	2.22			60	
♀	76.5	76.5	27.	9.5	35.3	6.52	0	0	1	1	1	1.76			61	
♀	71.5	71.5	28.	10.	35.6	6.14	0	0	1	1	1	1.72			62	
♀	80.0	80.0	23.	8.	34.8	5.30	0	0	1	1	1	1.22			63	
♀	71.0	71.0	23.	8.	34.8	4.88	0	0	1	1	0	1.12			64	
♀	67.5	67.5	25.	10.	40.0	4.37	0	0	1	1	0	1.09			65	
♀	74.5	70.5	26.	10.	38.5	5.70	0	0	1	1	0	1.48			66	
♀	71.5	70.0	23.	8.5	37.0	4.23	0	0	0	1	0	0.97			67	
♀	----	78.5	22.	8.	36.4	4.33	2	0	1	1	2	0.95			68	
♀	78.5	75.5	24.	9.	37.6	4.95	0	0	0	1	1	1.19			69	
♀	79.5	79.5	24.	8.	33.3	5.32	0	0	1	1	0	1.28			70	
♀	77.0	72.5	22.	8.	36.4	4.33	2	0	1	0	2	0.95			71	
♀	76.5	76.5	23.	8.	34.8	5.67	0	0	1	1	1	1.30			72	
♀	81.5	81.5	21.	7.5	35.8	4.28	0	0	1	1	2	0.90			73	
♀	----	72.0	25.	8.	32.1	5.48	0	0	1	0	0	1.37			74	
♀	72.5	72.5	26.	11.	42.3	5.14	2	0	2	1	2	1.34			75	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	76.5	76.5	23.	8.	34.9	4.62	0	0	1	0	0	1.06			76
♀	----	79.0	22.	8.	36.4	3.83	0	0	1	0	0	0.84			77
♀	70.0	70.0	28.	11.	39.3	5.35	0	0	0	2*	1	1.50			78
♀	79.0	79.0	28.	10.	35.7	6.90	0	0	1	1	1	1.93			79
♀	76.0	65.5	36.	13.	36.1	12.5	0	0	1	1	2	4.50			80
♀	68.0	68.0	32.	12.	37.4	8.65	0	0	2	1	1	2.77			81
♀	72.5	72.5	31.	11.	35.6	11.9	0	0	2	1	2	3.68			82
♀	80.0	76.0	30.	10.	33.3	8.11	1	0	1	1	2	2.43			83
♀	82.0	75.5	28.	9.	32.2	8.48	0	0	1	1	1	2.37			84
♀	75.0	70.5	29.	10.	34.5	7.95	0	0	1	1	2	2.30			85
♀	75.0	75.0	31.	12.	38.8	9.40	0	0	1	1	1	2.92			86
♀	----	86.0	26.5	8.	30.3	7.87	0	0	1	0	0	2.08			87
♀	73.5	73.5	25.5	10.	39.3	5.24	0	0	0	1	1	1.34			88
♀	86.0	75.5	26.	7.	36.9	6.85	0	0	1	1	0	1.78			89
♀	97.0	97.0	25.	6.5	26.0	7.90	2	0	1	1	2	1.97			90
♀	69.5	69.5	24.	10.	41.7	8.10	0	0	0	1	1	1.94			91
♀	69.5	69.5	25.	10.	40.0	5.12	0	0	1	1	1	1.28			92
♀	78.5	78.5	24.5	8.	32.7	6.52	0	0	1	0	2	1.60			93
♀	73.5	73.5	22.	9.	41.0	3.27	0	0	1	1	0	0.72			94
♀	----	77.5	27.	10.	37.0	7.23	0	0	2	1	1	1.95			95
♀	73.5	71.0	26.	9.	34.6	4.88	0	0	0	1	1	1.27			96
♀	----	76.0	22.	7.	31.8	3.96	0	0	1	2	0	0.87			97
♀	73.5	73.5	24.	8.	33.3	3.88	0	0	0	1	0	0.93			98
♀	68.5	68.5	23.5	9.	38.3	3.71	0	0	1	1	0	0.87			99
♀	68.5	68.5	24.	9.	37.5	4.13	0	0	0	1	1	0.99			100

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	78.5	78.5	25.	8.	32.1	5.76	0	0	1	0	0	1.44			101
♀	----	81.0	19.	7.	36.9	3.43	0	0	0	1	1	0.65			102
♀	74.0	74.0	20.	8.	40.0	3.77	0	0	1	1	1	0.55			103
♀	----	71.0	20.	7.	35.0	3.66	0	0	1	2	1	0.73			104
♀	76.0	76.0	20.	7.	35.0	3.26	0	0	1	1	1	0.65			105
♀	75.5	75.5	20.	7.	35.0	3.26	0	0	0	1	1	0.65			106
♀	73.5	69.5	21.	8.	38.0	2.58	0	0	0	2	1	0.54			107
♀	73.5	73.5	20.	7.	35.0	2.81	2	0	1	1	2	0.56			108
♀	72.5	67.5	20.	7.	35.0	3.21	0	0	1	1	1	0.64			109
♀	70.5	70.5	23.5	8.	34.1	2.82	0	0	1	1	0	0.66			110
♀	65.5	65.5	22.	8.	36.4	3.00	0	0	0	0	1	0.66			111
♀	76.0	76.0	21.	8.	38.1	3.86	0	0	1	2	1	0.81			112
♀	70.5	70.5	22.	8.	36.4	2.96	0	0	1	1	1	0.65			113
♀	78.0	78.0	20.	6.	30.0	3.26	0	0	1	0	1	0.65			114
♀	----	75.5	20.	7.	35.0	2.36	0	0	1	1	1	0.47			115
♀	81.0	76.5	30.5	10.	28.7	8.84	2	0	0	1	2	2.69			116
♀	73.0	71.0	32.	11.	34.3	9.15	1	0	1	1	2	2.93			117
♀	73.5	73.5	33.	13.	39.3	10.5	0	0	2	1	2	3.47			118
♀	73.0	67.5	30.	10.	33.3	7.60	0	0	0	0	0	2.28			119
♀	78.5	71.5	30.	12.5	41.7	9.35	0	0	1	0	0	2.80			120
♀	82.5	80.0	31.	11.	35.5	11.1	0	0	1	0	1	3.42			121
♀	80.0	75.5	32.5	11.5	35.4	7.70	2	0	0	2	2	2.50			122
♀	84.0	79.5	30.5	10.	32.8	9.68	1	0	2	0	1	2.94			123
♀	77.5	75.5	32.	12.	37.3	9.20	0	0	1	1	1	2.94			124
♀	76.0	74.5	31.	10.	32.3	10.3	0	0	0	0	0	3.18			125

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight	No.
♀	80.0	80.0	27.	8.	29.7	6.37	0	0	1	1	1	1.72	126
♀	78.0	78.0	19.	6.	31.7	3.43	0	0	1	1	0	0.65	127
♀	81.5	81.5	16.5	5.	30.4	2.62	0	0	0	0	1	0.43	128
♀	----	82.5	17.5	6.	34.3	2.42	0	0	0	1	1	0.42	129
♀	89.5	89.5	16.5	5.	30.4	3.03	0	0	0*	0	0	0.50	130
♀	76.0	76.0	16.	4.5	28.2	2.26	0	0	1	1	0	0.36	131
♀	76.0	76.0	17.	5.	29.5	1.65	0	0	0	1	1	0.28	132
♀	80.5	80.5	16.5	6.	37.6	2.25	2	0	1	1	2	0.37	133
♀	75.5	75.5	15.	5.	33.3	1.32	0	0	0	1	0	0.20	134
♀	----	69.0	15.5	6.	38.8	1.29	0	0	0	1	0	0.20	135
♀	73.5	73.5	14.5	5.5	37.9	1.58	0	0	0	1	1	0.23	136
♀	70.0	70.0	15.	6.	40.0	1.41	0	0	0	1	0	0.21	137

Eastport-II. Females.

Seriation of Data

Unclean Angle

1	65.5	71.5	73.5	74.5	76	78	79	81
2	67	71.5	73.5	74.5	76	78	79	81.5
3	67.5	71.5	73.5	75	76	78	79.5	81.5
4	68	71.5	73.5	75	76	78	80	81.5
5	68.5	72	73.5	75	76	78	80	82
6	68.5	72	73.5	75	76.5	78	80	82.5
7	69	72.5	73.5	75.5	76.5	78	80	82.5
8	69.5	72.5	73.5	75.5	76.5	78.5	80	82.5
9	69.5	72.5	74	75.5	76.5	78.5	80	83
10	69.5	72.5	74	75.5	76.5	78.5	80	83
11	70	72.5	74	75.5	77	78.5	80	84
12	70	73	74	75.5	77	78.5	80	84
13	70	73	74	76	77	78.5	80.5	84
14	70	73	74	76	77	78.5	80.5	84.5
15	70.5	73	74	76	77	79	80.5	86
16	70.5	73	74.5	76	77.5	79	80.5	87
17	71	73.5	74.5	76	77.5	79	81	89.5
								97

Classes	62.5-66.4	66.5-70.4	70.5-74.4	74.5-78.4	78.5-82.4
	64.5	68.5	72.5	76.5	80.5
Frequency	1	13	35	43	32

82.5-86.4	86.5-90.4	90.5-94.4	94.5-98.5
84.5	88.5	92.5	96.5
10	3	0	1

EASTPORT II

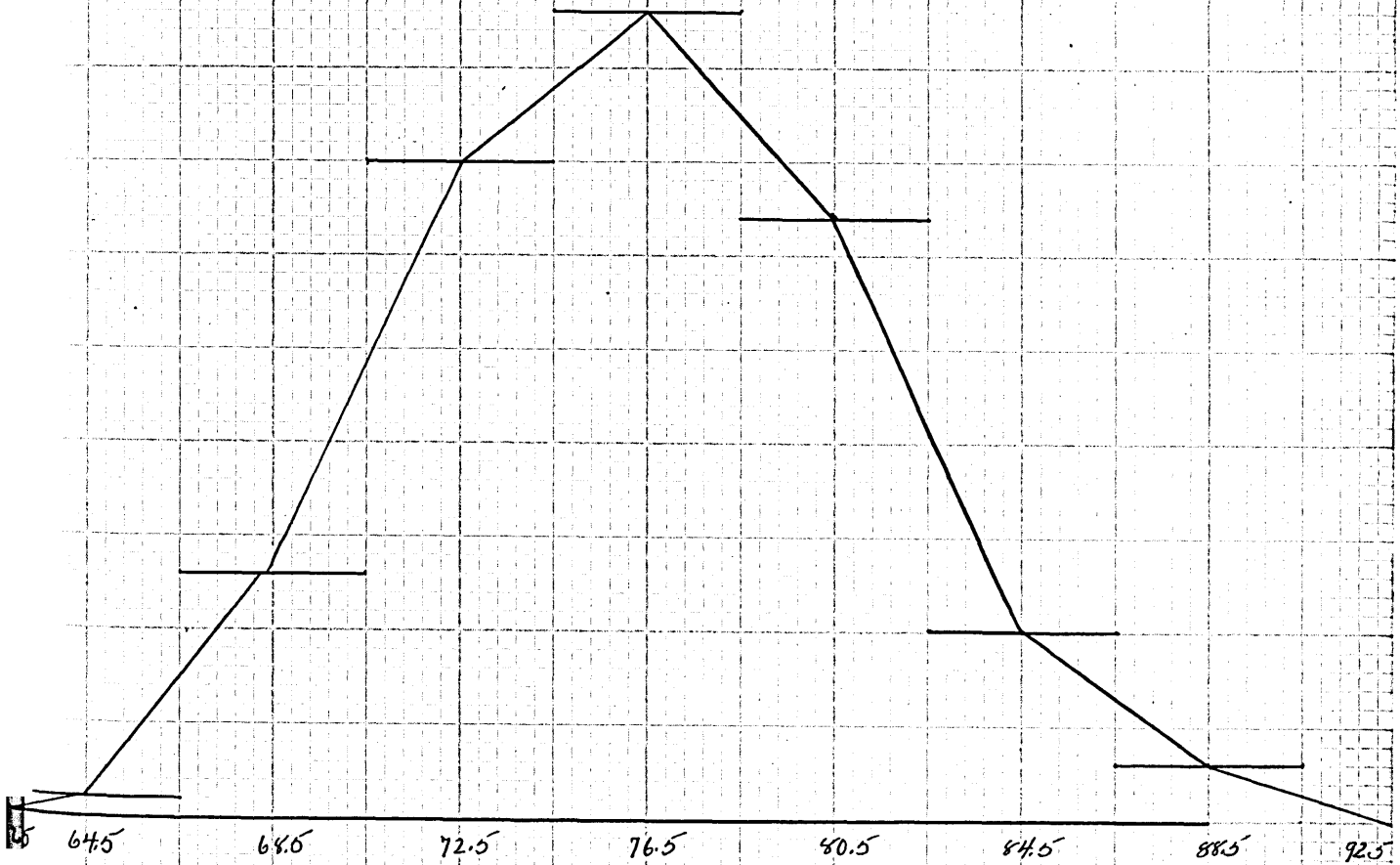
♀

Nuclear Angle

Mean 76.51°

Mode 76.5°

σ 4.91°



Eastport II ♀ Females.

Seriation of Data

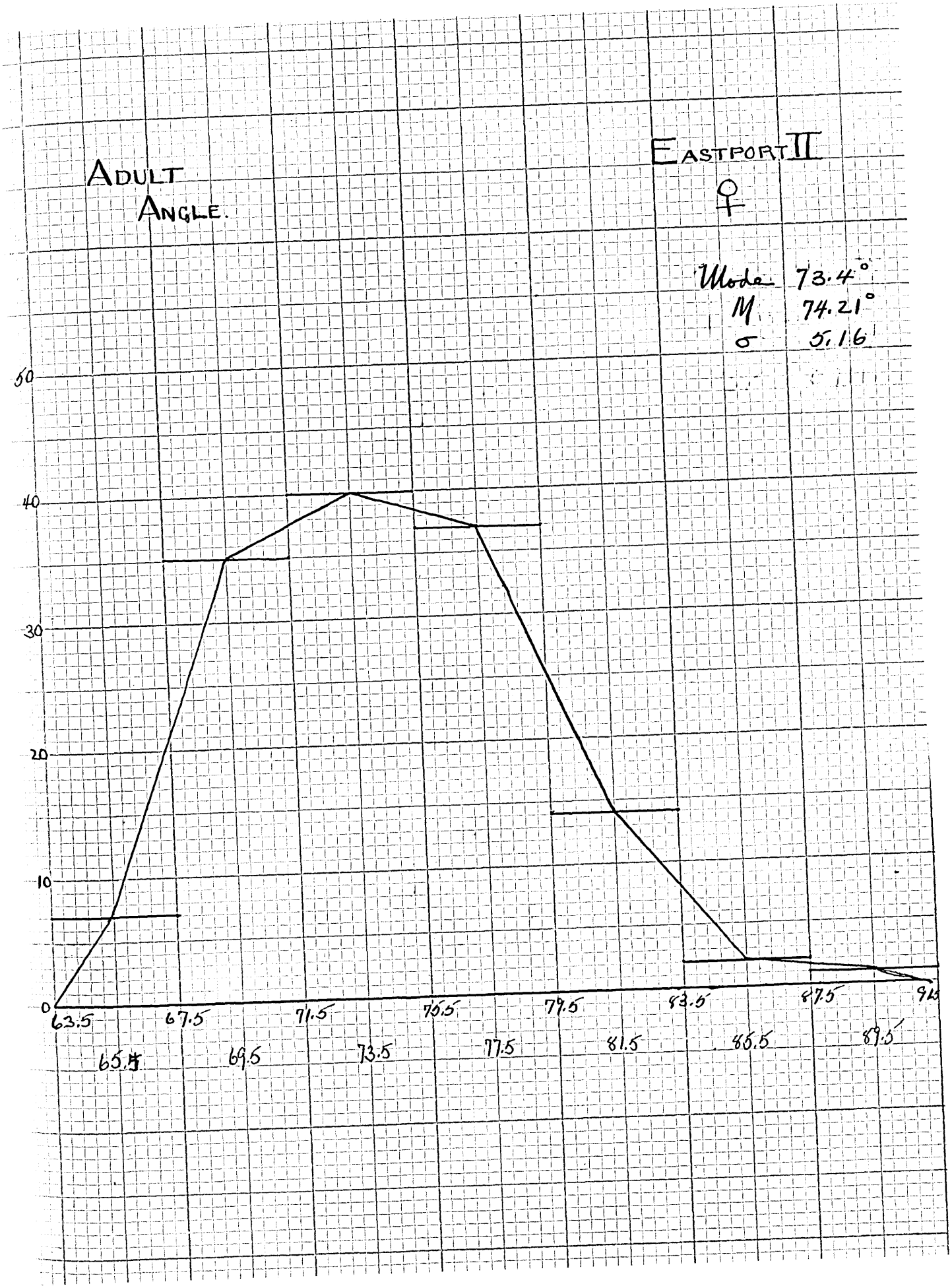
Adult Angle

1	57.5	69	70.5	72	73.5	75.5	76.5	79.5
2	65.5	69.5	70.5	72	73.5	75.5	76.5	79.5
3	65.5	69.5	70.5	72	74	75.5	76.5	80
4	66	69.5	70.5	72.5	74	75.5	76.5	80
5	66.5	69.5	71	72.5	74	75.5	77.5	80
6	67	70	71	72.5	74	75.5	77.5	80
7	67	70	71	72.5	74.5	75.5	78	80.5
8	67	70	71	73	74.5	75.5	78	81
9	67.5	70	71	73	74.5	75.5	78	81.5
10	67.5	70	71.5	73	75	76	78.5	81.5
11	67.5	70	71.5	73	75	76	78.5	82
12	68	70	71.5	73.5	75	76	78.5	82.5
13	68	70	71.5	73.5	75	76	78.5	82.5
14	68	70	71.5	73.5	75	76	79	83
15	68.5	70	72	73.5	75.5	76	79	84.5
16	68.5	70.5	72	73.5	75.5	76	79	86
17	68.5	70.5	72	73.5	75.5	76	79	89.5
								97.

Classes.	55.5-59.4	59.5-63.4	63.5-67.4	67.5-71.4
	57.4	61.4	65.4	69.4
Frequency	1	0	7	35

71.5-75.4	75.5-79.4	79.5-83.4	83.5-87.4	87.5-91.4	91.5-95.4
73.4	77.4	81.4	85.4	89.4	93.4
40	37	14	2	1	0

95.5-99.4.
97.4


ADULT
ANGLE.
EASTPORT II
♀
Mode 73.4°
M 74.21°
σ 5.16
50
40
30
20
10
0
63.5
65.5
67.5
69.5
71.5
73.5
75.5
77.5
79.5
81.5
83.5
85.5
87.5
89.5

Seriation of Data

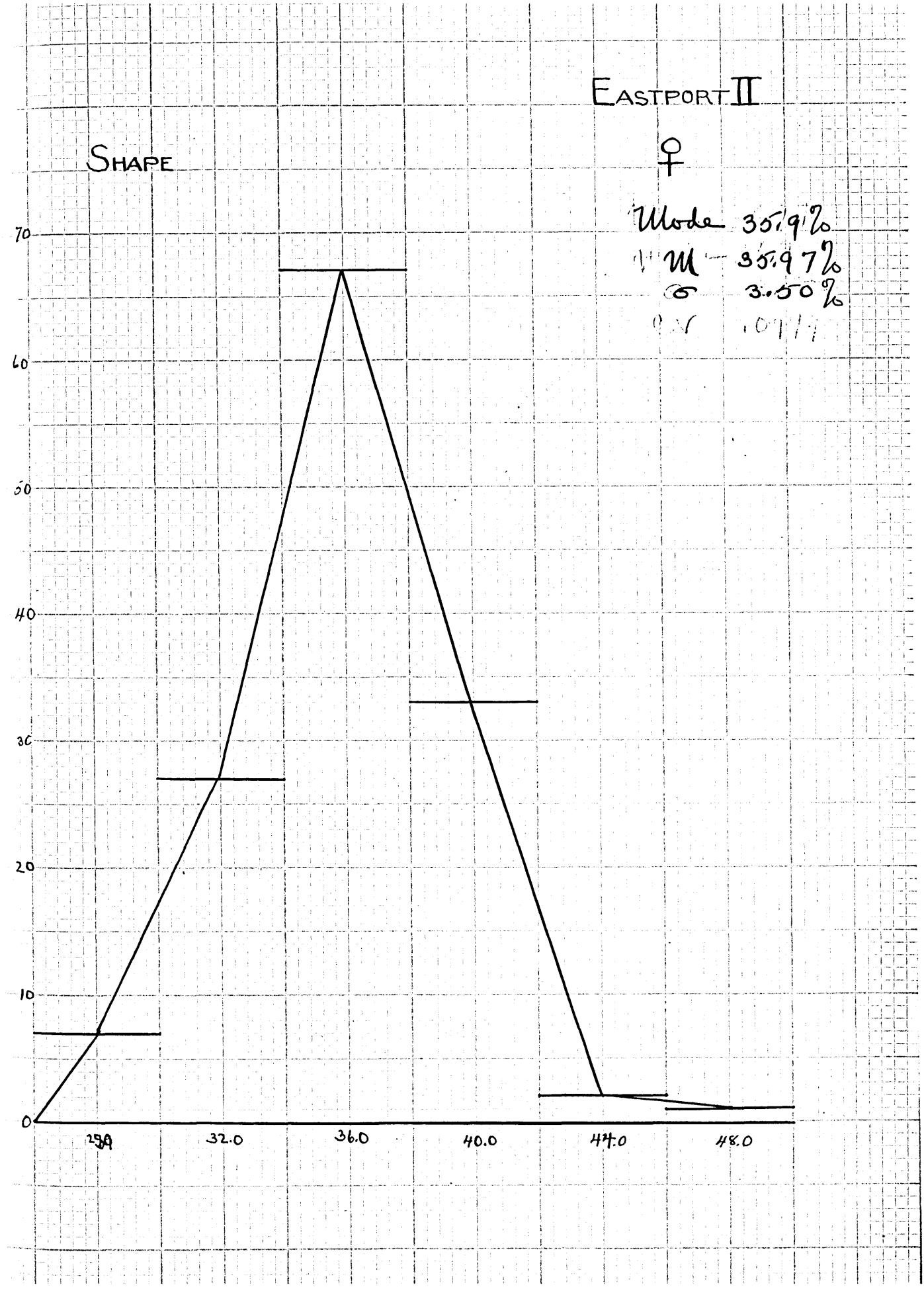
Eastport II. Females.

Shape Ratio

1	26	32.3	34.1	35	36.1	37	38	39.6
2	27.2	32.7	34.3	35	36.4	37	38.1	40
3	28.2	32.7	34.3	35	36.4	37	38.1	40
4	28.3	32.7	34.4	35	36.4	37.1	38.1	40
5	28.7	32.8	34.5	35	36.4	37.1	38.3	40
6	29.5	32.8	34.6	35.3	36.4	37.1	38.5	40
7	29.7	32.8	34.7	35.4	36.5	37.3	38.5	40
8	30	33.3	34.7	35.5	36.5	37.3	38.6	40
9	30.3	33.3	34.8	35.5	36.5	37.4	38.6	40
10	30.4	33.3	34.8	35.6	36.6	37.5	38.8	40
11	30.4	33.3	34.8	35.6	36.7	37.5	38.8	40.8
12	31.7	33.3	34.8	35.7	36.7	37.6	39.2	40.9
13	31.8	33.3	34.8	35.7	36.7	37.6	39.3	41
14	32.1	33.3	34.8	35.7	36.7	37.7	39.3	41.7
15	32.1	33.3	34.9	35.8	36.9	37.8	39.3	41.7
16	32.2	33.4	35	35.8	36.9	37.9	39.3	42.3
17	32.2	33.9	35	36	36.9	38	39.3	42.8
								46.6

Classes	26.0 - 29.9 27.9	30.0 - 33.9 31.9	34.0 - 37.9 35.9	38.0 - 41.9 39.9
Frequency	7	27	67	33

42.0 - 45.9 43.9	46.0 - 49.9 47.9
2	1

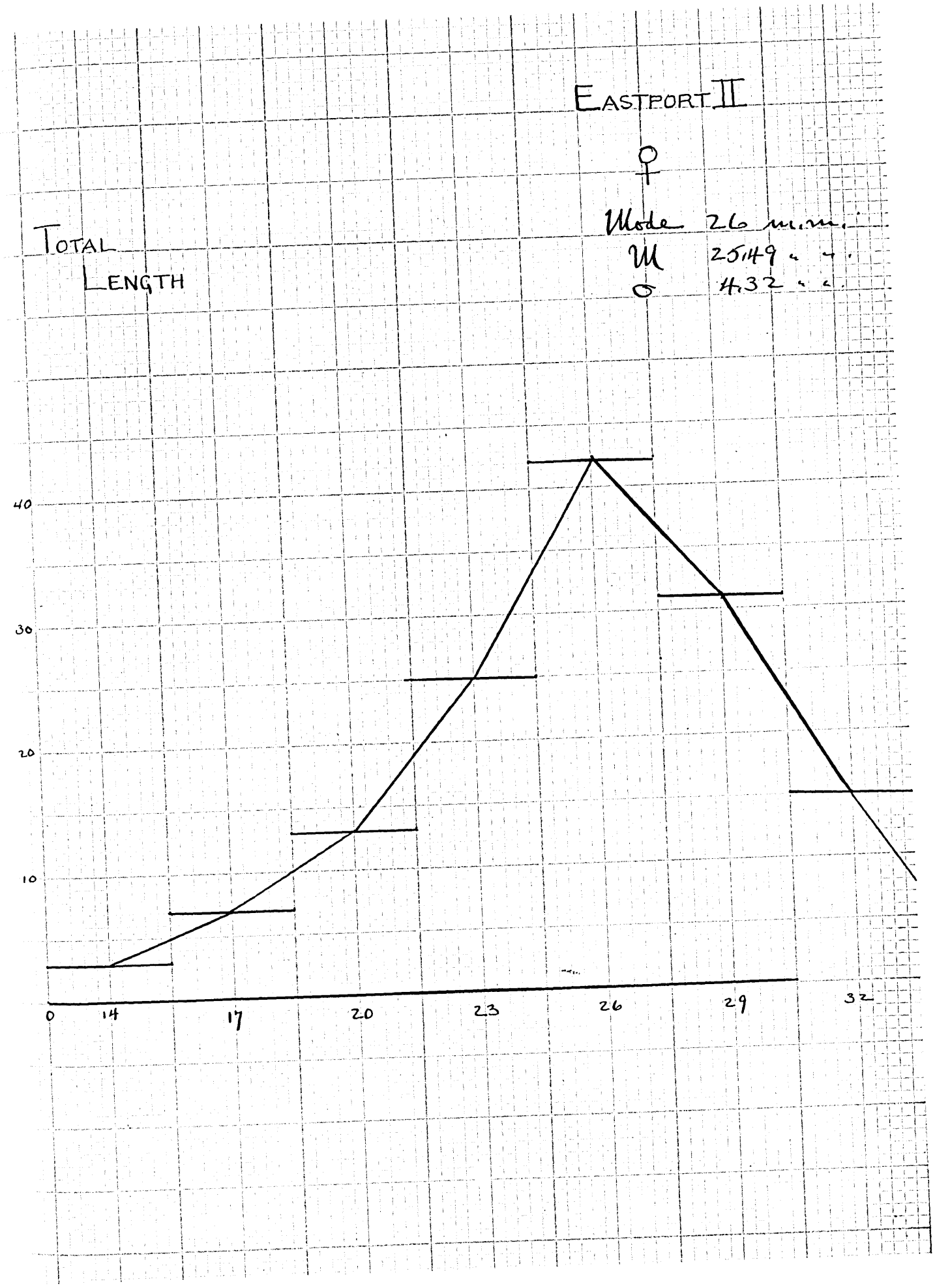

EASTPORT II
♀
SHAPE
Mode 35.9%
M 35.97%
σ 3.50%
70
60
50
40
30
20
10
0
28.0
32.0
36.0
40.0
44.0
48.0

Eastport II ♀ — Seriation Data

Total Lengths.

1	14.5	21.	24.	25.5	27.	28.	30.	
2	15.	21.	24.	25.5	27.	28.	30.5	
3	15.	21.	24.	26.	27.	28.	30.5	
4	15.5	22.	24.	26.	27.	28.	31.	
5	16.	22.	24.	26.	27.	28.5	31.	
6	16.5	22.	24.	26.	27.	29.	31.	
7	16.5	22.	24.	26.	27.	29.	31.	
8	16.5	22.	24.	26.	27.	29.	31.	
9	~~16.5~~ 17.	22.	24.5	26.	27.	29.	31.	
10	17.5	22.	24.5	26.	27.	29.5	31.5	
11	19.	23.	25.	26.	27.5	30.	31.5	
12	19.	23.	25.	26.	27.5	30.	32.	
13	20.	23.	25.	26.5	27.5	30.	32.	
14	20.	23.	25.	26.5	28.	30.	32.	
15	20.	23.	25.	26.5	28.	30.	32.5	
16	20.	23.	25.	26.5	28.	30.	33.	
17	20.	23.	25.	26.5	28.	30.	36.	
18	20.	23.	25.	27.	28.	30.		
19	20.	23.5	25.	27.	28.	30.		
20	20.	23.5	25.	27.	28.	30.		

Classes	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36
	14	17	20	23	26	29	32	35
Frequency	3	7	13	25	42	31	15	1


EASTPORT II
♀
Mode 26 m.m.
M 25.149 + .
σ 4.32 + .
TOTAL LENGTH
40
30
20
10
0
14
17
20
23
26
29
32

Locality. Eastport II. Females. Seriation of Data

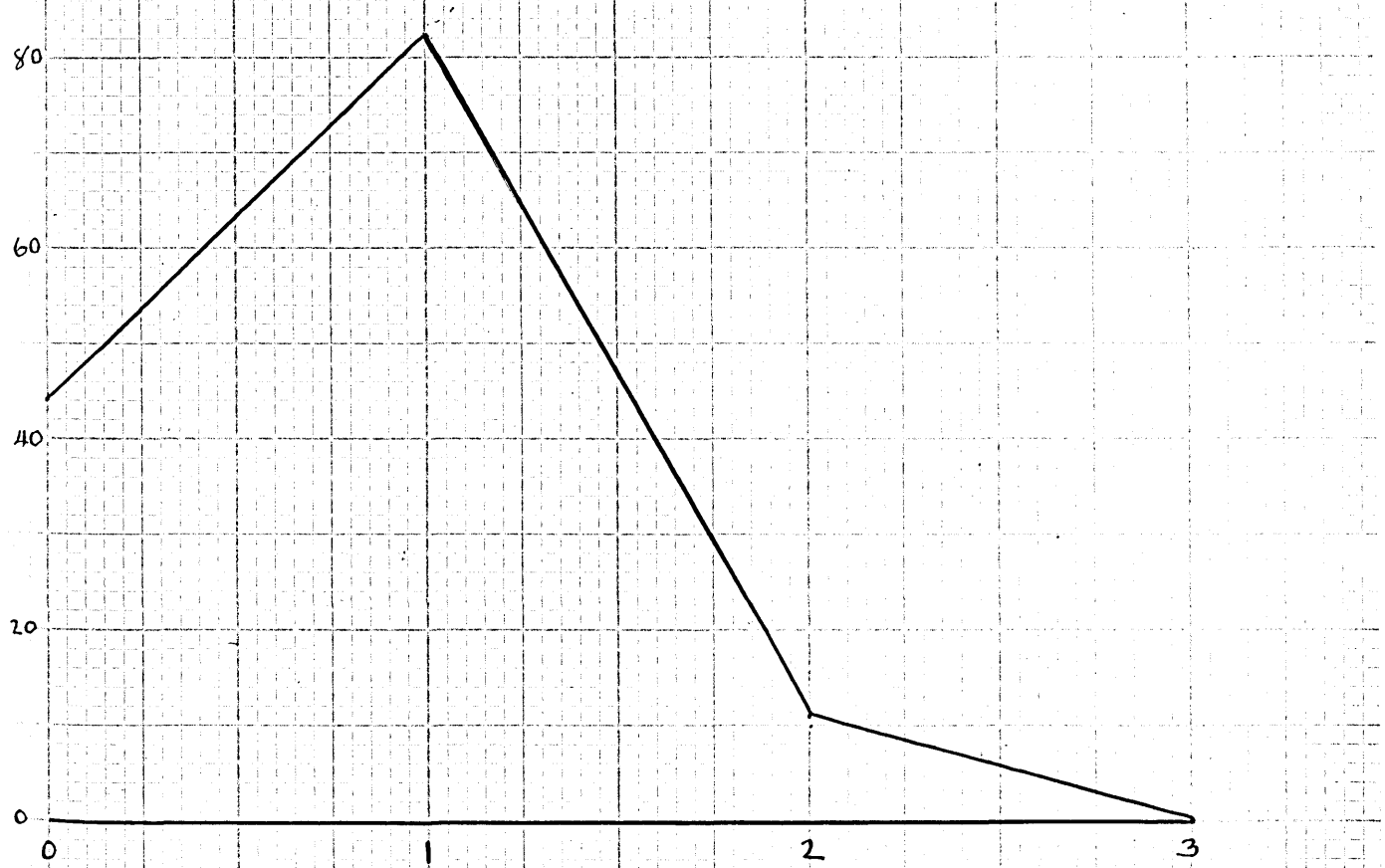
Characters						
Imbrications	Classes	0	1	2	Tot.	
	Frequency	116	10	11	137	
Teeth	Classes	0	1	2		
	Frequency	137	0	0	137	
Columella	Classes	0	1	2	3	
	Frequency	44	82	11	0	137
Sutures	Classes	0	1	2	137	
	Frequency	26	101 ~~131~~	10	~~167~~	
Ribs.	Classes	0	1	2	137	
	Frequency	39	~~67~~	31	~~167~~	

EASTPORT II

♀

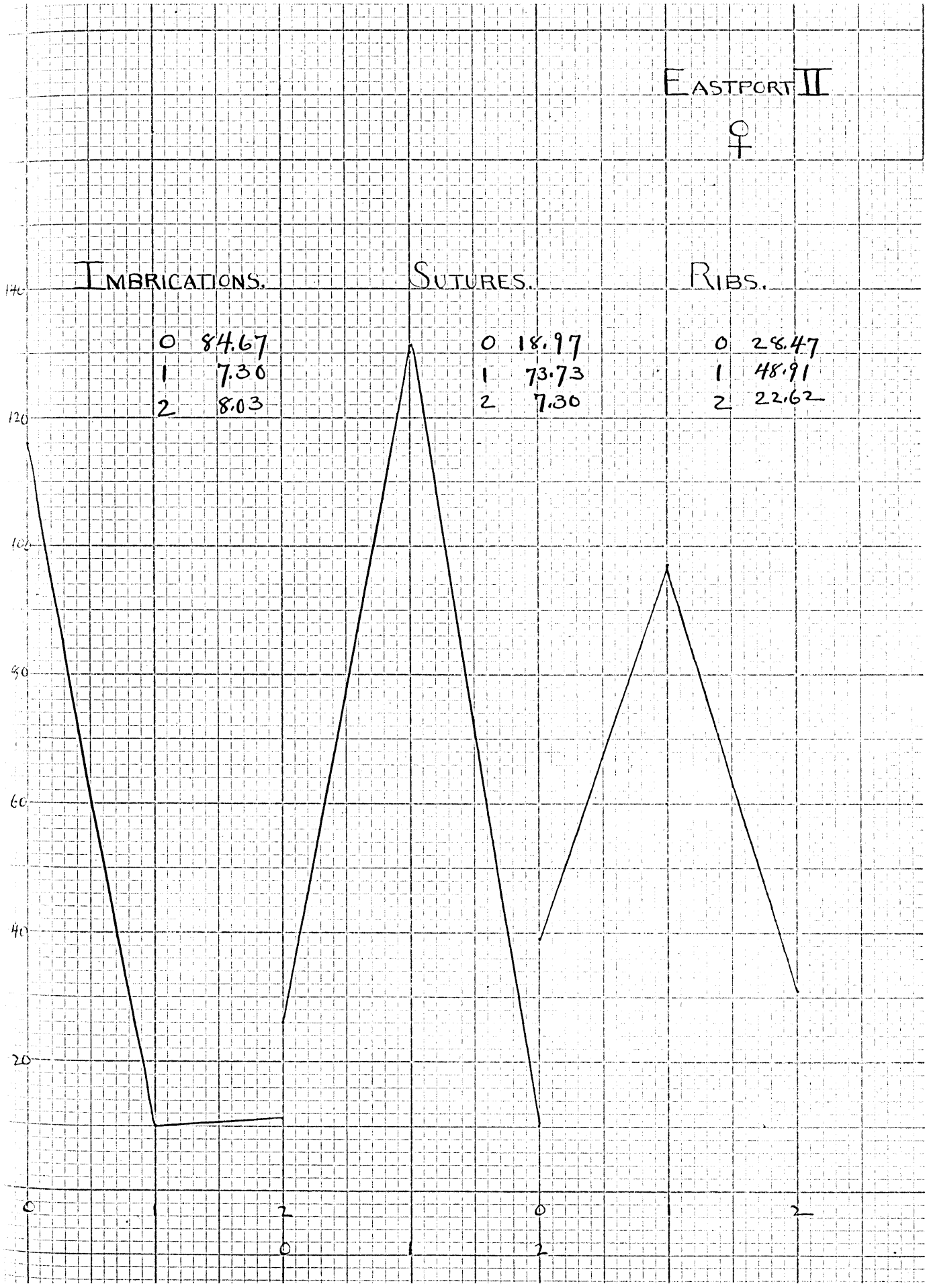
0	32.16 %
1	59.81 %
2	8.03 %
3	0 %

COLUMELLA



EASTPORT II

♀


IMBRICATIONS.
0 84.67
1 7.30
2 8.03
SUTURES.
0 18.97
1 73.73
2 7.30
RIBS.
0 28.47
1 48.91
2 22.62
140
120
100
80
60
40
20
0
1
2
0
1
2
0
1
2

COLLECTION NO. 5.

SHELLS FROM KENNEBUNK BEACH.

1477 SPECIMENS.

KENNEBUNK BEACH, MAINE.

Collection made Friday, December 1, at 2:15 P. M., at Kennebunk Beach, Kennebunk, Maine.

Position exposed, shore rocky and rugged, opening freely to the sea and covered with rock-weed. Surf action very great. The collection lasted an hour and a quarter.

The shells were all small and of a uniform white color.

COLLECTION NO. 6.

MALE SHELLS FROM GLOUCESTER.

188 SPECIMENS.

GLOUCESTER. Males.

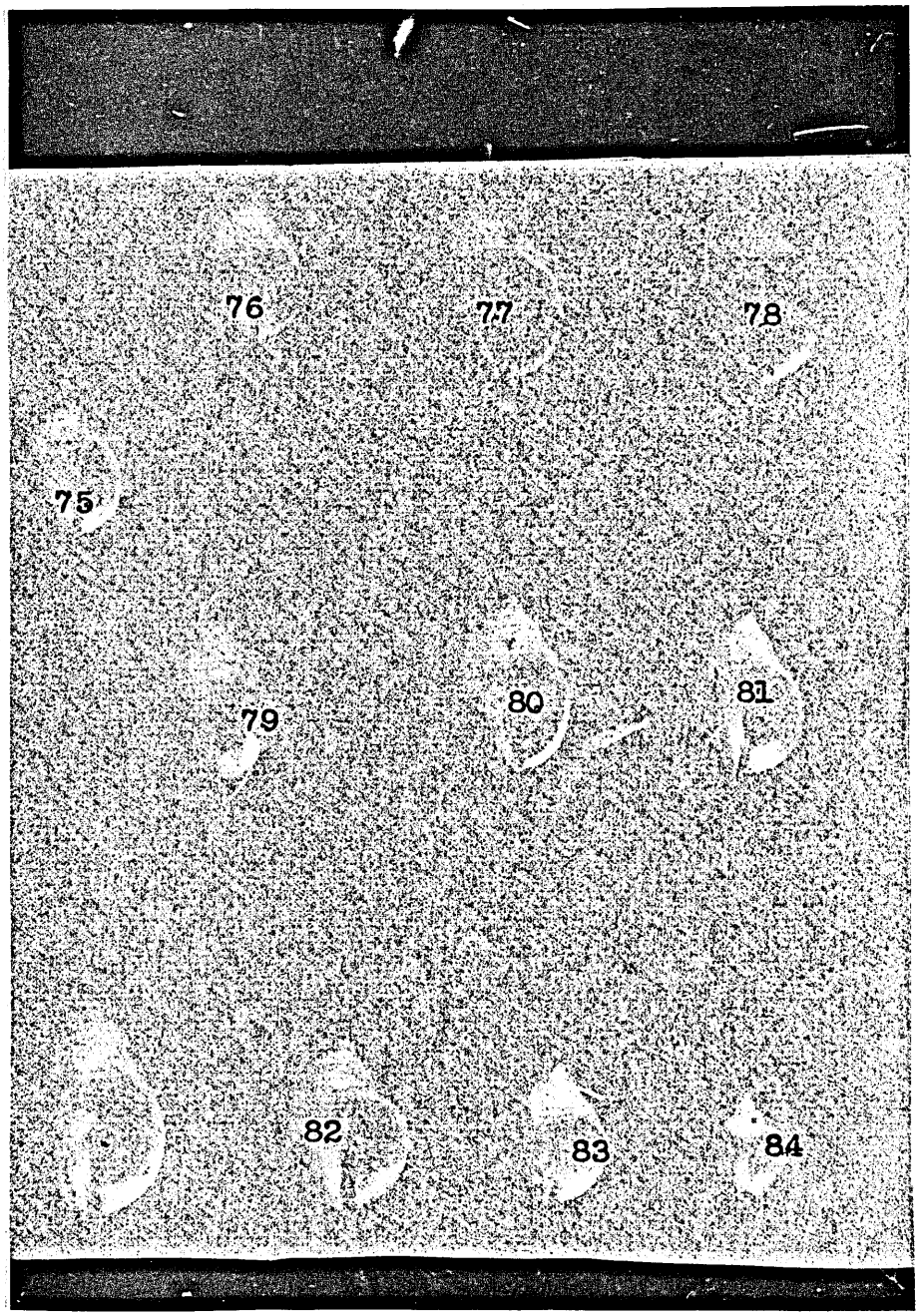
Collection made about November 4, at Bass Rocks, Gloucester, on the shore to the east of the Hotel Moreland.

Locality exposed, rocky, rugged and bearing rock-weed. Surf action very great. The shells show a great variety of colors and bands, a fact which may be due to the abundance of red and green algae there. The general color-tone of the shells is much lighter than at Eastport, but not so light as those at Kennebunk Beach. The collection occupied half an hour.

PLATE X.

GLOUCESTER. Males.

Figs.	75-78	Nuclear Angle.
"	75, 79-81	Adult "
"	82-85	Total Length.


76
77
78
75
79
80
81
82
83
84

Locality, Gloucester. Males. Measurements. 1.

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	94.5	94.5	21.	5.	23.8	7.15	0	0	0	0	1	1.50			1
θ	81.0	81.0	26.	10.	38.7	10.8	0	0	0	0	0	2.80			2
θ	84.0	84.0	23.	8.	34.8	10.3	0	1	1	0	0	2.36			3
θ	92.0	86.5	21.	7.	33.3	9.05	0	1	2	0	0	1.89			4
θ	----	82.5	21.	7.	33.3	5.48	0	0	1	0	1	1.15			5
θ	87.5	87.5	21.	7.	33.3	8.20	0	0	1	0	0	1.72			6
θ	76.5	76.5	25.	7.	28.1	9.70	0	0	0	0	1	2.42			7
θ	----	79.0	21.	7.	33.3	6.10	0	0	1	1	1	1.28			8
θ	89.0	84.5	19.	6.5	34.2	6.75	0	0	0	0	0	1.28			9
θ	----	83.5	22.	6.	27.3	6.47	0	0	2	0	1	1.42			10
θ	96.5	96.5	18.	5.	27.9	8.35	0	2	2	0	1	1.50			11
θ	90.0	86.0	21.	5.	23.8	7.50	0	0	0	0	0	1.57			12
θ	94.5	84.5	21.	7.	33.3	9.40	0	2	1	0	0	1.97			13
θ	100.	100.	21.	6.	28.7	7.92	0	1	1	0	0	1.66			14
θ	----	67.5	29.	11.	38.0	6.84	0	0	0	1	1	1.98			15
θ	85.0	81.0	22.	7.	31.9	7.62	0	0	1	1	1	1.67			16
θ	----	72.5	23.	8.	34.8	9.65	0	2	1	0	0	2.22			17
θ	----	81.0	20.	7.	35.0	5.84	0	0	1	0	0	1.17			18
θ	86.0	82.5	23.	8.	34.8	9.55	0	1	1	0	0	2.19			19
θ	89.0	89.0	26.	7.	26.9	11.2	0	2	1	1	1	2.90			20
θ	90.0	85.5	22.	7.	31.9	10.0	0	1	1	0	0	2.20			21
θ	86.0	86.0	18.	4.5	25.1	5.00	0	0	1	0	0	0.90			22
θ	95.5	95.5	20.	6.	30.0	7.50	0	0	1	1	0	1.50			23
θ	----	85.5	22.	6.	27.3	8.76	0	0	0	0	0	1.93			24
θ	91.5	91.5	22.	7.	31.9	11.2	0	1	1	0	0	2.45			25

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
θ	86.5	86.5	24.	7.	29.2	9.46	0	0	2	0	0	2.27			26	
θ	94.5	89.0	20.	7.	35.0	7.83	0	0	1	1	0	1.56			27	
θ	----	86.0	21.	7.	33.3	7.45	0	0	2	1	0	1.56			28	
θ	----	84.0	20.5	8.	39.0	6.85	0	1	0	0	1	1.40			29	
θ	84.0	84.0	21.	7.	33.3	8.65	0	1	0	1	1	1.81			30	
θ	76.5	76.5	21.	7.5	35.7	8.05	0	0	1	1	1	1.69			31	
θ	85.0	85.0	21.	6.5	31.0	8.25	0	1	1	0	0	1.73			32	
θ	84.5	84.5	21.	7.	33.3	8.35	0	1	0	0	0	1.75			33	
θ	79.5	79.5	23.	8.	34.8	8.25	0	0	0	0	1	1.89			34	
θ	101.	101.	21.	5.	23.8	7.97	0	0	1	0	0	1.67			35	
θ	83.0	83.0	19.	7.	36.9	6.49	0	2	0	0	0	1.23			36	
θ	----	85.5	20.	7.	35.0	7.35	0	0	0	1	2	1.47			37	
θ	89.5	89.5	19.	6.	31.7	6.75	0	0	1	1	1	1.28			38	
θ	----	81.5	22.	8.	36.5	10.2	0	0	1	0	1	2.24			39	
θ	92.0	82.5	19.	6.	31.7	7.91	0	0	2	0	0	1.50			40	
θ	91.0	90.0	23.	7.	30.5	7.91	0	0	2	1	0	1.82			41	
θ	76.0	76.0	21.	7.	33.3	8.40	0	1	1	0	0	1.76			42	
θ	91.5	91.5	20.	6.	30.0	7.92	0	0	1	1	0	1.58			43	
θ	84.5	84.5	21.	8.	38.1	9.80	0	2	1	1	0	2.05			44	
θ	87.0	87.0	20.	5.	25.0	6.30	0	0	0	1	0	1.26			45	
θ	90.0	90.0	19.	6.	31.7	6.12	0	0	2	1	0	1.16			46	
θ	86.5	86.5	19.	7.	36.9	7.28	0	2	1	0	0	1.38			47	
θ	86.5	86.5	21.	8.	38.0	8.58	0	2	1	0	0	1.80			48	
θ	85.0	85.0	22.	7.	31.9	7.20	0	2	1	1	0	1.58			49	
θ	87.0	87.0	19.	5.	26.3	8.60	0	0	2	0	0	1.63			50	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	94.0	94.0	20.	6.	30.0	8.57	0	2	1	0	0	1.71			51
θ	86.5	84.5	21.	6.	28.7	7.95	0	1	1	0	0	1.67			52
θ	82.5	82.5	20.	6.	30.0	7.40	0	1	2	0	0	1.48			53
θ	92.0	87.5	21.	7.	33.3	8.69	0	1	2	0	0	1.82			54
θ	85.0	85.0	20.	6.	30.0	8.29	0	0	1	0	0	1.65			55
θ	85.0	85.0	20.	7.	35.0	6.84	0	1	2	0	0	1.37			56
θ	78.0	78.0	20.	8.	40.0	7.50	0	2	2	0	0	1.50			57
θ	96.5	96.5	20.	6.	30.0	6.20	0	0	1	0	0	1.24			58
θ	80.0	80.0	21.	7.	33.3	9.45	0	2	1	0	0	1.98			59
θ	80.0	75.5	21.	8.	38.2	9.90	0	1	0	0	0	2.08			60
θ	89.0	89.0	19.	5.	26.4	6.53	0	0	1	0	0	1.26			61
θ	----	81.0	20.	7.	35.0	9.41	0	0	1	0	0	1.88			62
θ	73.5	73.5	20.	7.	35.0	6.05	0	0	0	0	0	1.21			63
θ	78.5	78.5	20.	7.	35.0	6.84	0	1	1	0	0	1.37			64
θ	91.5	91.5	21.	6.	28.6	7.91	0	0	1	0	0	1.66			65
θ	92.0	92.0	19.5	7.5	38.6	8.12	0	2	1	0	0	1.58			66
θ	75.5	75.5	19.	7.	36.8	7.32	0	0	1	0	0	1.39			67
θ	84.5	84.5	20.	6.	30.0	7.25	0	1	1	0	0	1.45			68
θ	81.0	81.0	18.	6.	33.3	9.45	0	0	1	0	0	1.07			69
θ	85.5	77.0	22.	7.	31.9	7.47	0	0	1	0	0	1.64			70
θ	78.5	78.5	20.	7.	35.0	7.16	0	1	1	0	0	1.43			71
θ	78.0	72.5	21.	8.	38.1	7.00	0	0	1	0	0	1.47			72
θ	94.0	94.0	18.	5.	27.8	6.28	0	0	1	0	0	1.13			73
θ	77.5	77.5	19.	6.	31.7	5.32	0	0	1	0	0	1.05			74
θ	96.5	96.5	16.5	5.	30.4	5.34	0	0	1	0	0	0.88			75

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
θ	91.0	91.0	17.	5.	29.4	5.72	0	0	1	0	0	0.93			76	
θ	79.0	79.0	19.	7.	36.9	5.08	0	0	0	0	0	0.96			77	
θ	----	87.5	19.	6.5	34.3	7.18	0	1	1	0	0	1.36			78	
θ	84.0	84.0	18.	6.	33.3	9.20	0	1	2	0	1	1.65			79	
θ	89.5	85.0	20.	8.	40.0	7.82	0	1	1	0	0	1.56			80	
θ	----	70.5	21.	7.	33.3	7.06	0	0	1	0	0	1.48			81	
θ	85.0	85.0	20.	7.	35.0	7.87	0	0	0	0	0	1.57			82	
θ	----	86.5	18.	6.	33.3	6.69	0	1	1	1	1	1.20			83	
θ	78.0	78.0	18.	6.	33.3	5.44	0	0	1	1	1	0.98			84	
θ	77.5	77.5	19.	7.	36.9	5.79	0	1	1	1	0	1.10			85	
θ	90.0	90.0	18.	6.	33.3	7.14	0	0	0	0	0	1.28			86	
θ	82.5	82.5	19.	7.	36.9	7.17	0	0	0	1	0	1.36			87	
θ	----	87.5	19.	6.	31.7	6.26	0	0	1	0	0	1.19			88	
θ	----	94.0	17.	5.	29.4	5.78	0	0	1	0	1	0.98			89	
θ	96.0	96.0	18.	7.	39.0	6.90	0	0	1	0	0	1.24			90	
θ	93.5	93.5	19.	6.	31.7	8.70	0	1	1	0	0	1.65			91	
θ	77.0	77.0	19.	7.	36.9	7.33	0	1	1	0	1	1.39			92	
θ	84.0	84.0	18.	5.	27.8	6.55	0	1	1	0	0	1.18			93	
θ	76.5	76.5	20.	7.	35.0	9.00	0	2	2	0	0	1.80			94	
θ	86.0	86.0	20.	7.	35.0	7.50	0	0	2	0	0	1.50			95	
θ	89.0	89.0	18.	6.	33.3	7.30	0	1	2	0	0	1.31			96	
θ	90.0	90.0	18.	7.	38.9	6.73	0	1	1	0	0	1.21			97	
θ	78.0	78.0	19.	6.	31.7	6.15	0	0	1	0	1	1.17			98	
θ	86.5	86.5	17.	5.	29.4	5.90	0	0	0	0	0	1.01			99	
θ	87.5	87.5	17.	7.	41.3	6.00	0	0	1	0	0	1.12			100	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
θ	82.5	82.5	19.	7.	36.9	6.60	0	1	1	0	0	1.25			101	
θ	82.0	82.0	17.	6.	35.3	6.38	0	1	1	0	0	1.08			102	
θ	85.0	81.5	18.	6.	33.3	5.68	0	0	0	0	0	1.02			103	
θ	83.5	83.5	18.	6.	33.3	5.85	0	0	0	1	1	1.05			104	
θ	----	80.5	20.	6.	30.0	6.82	0	2	1	0	1	1.36			105	
θ	80.0	80.0	17.	7.	41.3	5.90	0	1	1	0	0	1.00			106	
θ	68.5	68.5	21.	8.	38.1	7.00	0	0	0	1	0	1.47			107	
θ	----	76.0	19.	7.	36.9	6.32	0	0	0	1	0	1.20			108	
θ	92.0	92.0	18.	5.	37.8	5.72	0	0	1	1	1	1.03			109	
θ	80.0	80.0	19.	7.	36.9	6.05	0	1	1	0	0	1.15			110	
θ	85.5	85.5	19.	5.	26.3	7.12	0	2	1	0	1	1.35			111	
θ	76.0	76.0	18.	6.	33.3	6.95	0	0	0	1	1	1.25			112	
θ	78.0	78.0	18.5	6.	32.6	5.85	0	0	1	0	2	1.08			113	
θ	84.0	84.0	20.	6.	30.0	6.65	0	1	1	0	0	1.33			114	
θ	82.0	82.0	18.	5.	37.8	5.40	0	0	1	1	1	0.97			115	
θ	85.5	85.5	17.	5.	29.6	5.60	0	0	1	1	1	0.95			116	
θ	84.0	79.5	16.	5.	31.3	10.5	0	0	1	1	0	1.68			117	
θ	72.5	72.5	19.	6.	31.7	5.05	0	0	0	0	0	0.96			118	
θ	----	91.0	16.	4.	25.0	4.15	0	0	1	1	2	0.66			119	
θ	82.5	82.5	17.	5.	29.6	4.60	0	1	1	0	0	0.78			120	
θ	----	83.0	17.	5.	29.6	5.06	0	0	0	1	1	0.86			121	
θ	98.5	98.5	16.	3.	18.8	5.00	0	0	0	0	1	0.80			122	
θ	76.0	76.0	18.5	6.	32.7	5.95	0	2	1	1	1	1.10			123	
θ	----	87.0	17.	5.	29.6	5.55	0	0	1	0	1	0.94			124	
θ	76.0	76.0	19.	6.	31.7	5.80	0	0	2	1	0	1.10			125	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	----	86.0	17.	5.	29.4	5.90	0	1	1	1	1	1.00			126
θ	82.0	82.0	21.5	7.	32.7	7.38	0	0	1	0	0	1.58			127
θ	87.0	83.5	18.	5.	27.8	6.62	0	1	2	0	1	1.19			128
θ	----	85.5	16.5	6.	36.4	5.45	0	0	1	1	0	0.90			129
θ	81.0	81.0	17.	6.	35.3	5.18	0	1	1	0	0	0.88			130
θ	85.0	85.0	18.	5.	27.8	5.72	0	0	1	0	0	1.13			131
θ	----	79.0	18.	7.	39.0	3.17	0	0	0	1	1	0.57			132
θ	85.0	79.0	17.	5.	29.4	4.54	0	0	1	0	0	0.77			133
θ	----	75.0	18.	6.	33.3	4.28	0	0	1	0	0	0.77			134
θ	85.0	76.5	16.	5.	31.3	4.38	0	1	2	0	0	0.70			135
θ	----	86.5	17.	6.	35.3	5.76	0	0	0	0	1	0.98			136
θ	85.0	85.0	17.	5.	29.4	4.65	0	1	1	1	0	0.79			137
θ	----	95.0	15.	4.	26.8	4.68	1	0	1	1	2	0.70			138
θ	----	84.5	16.	6.	37.5	5.43	0	1	2	1	2	0.87			139
θ	----	80.5	18.	6.	33.3	5.79	0	2	1	1	1	1.14			140
θ	84.0	84.0	15.	4.	26.8	4.28	0	0	0	0	0	0.64			141
θ	----	76.5	18.	5.	27.8	4.62	0	0	0	1	2	0.83			142
θ	86.5	86.5	16.	5.	31.3	5.07	0	1	1	0	0	0.81			143
θ	----	82.5	17.	5.	29.4	4.58	0	1	0	0	1	0.78			144
θ	----	83.5	16.5	5.	30.4	4.07	0	0	1	1	1	0.67			145
θ	93.5	91.5	16.	5.	31.3	5.13	0	1	1	0	1	0.82			146
θ	----	82.0	16.	5.	31.3	2.38	0	0	1	0	0	0.38			147
θ	----	81.5	16.5	5.	30.4	5.28	0	0	0	0	2	0.87			148
θ	----	82.0	16.	5.	31.3	4.50	0	0	1	1	2	0.72			149
θ	----	88.5	16.	4.	25.0	3.88	0	0	1	0	1	0.62			150

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
θ	72.0	72.0	18.	6.	33.3	5.58	0	1	1	0	1	1.00			151	
θ	87.5	87.5	16.	4.	25.0	4.94	0	0	0	0	1	0.79			152	
θ	----	76.5	17.	6.	35.3	5.24	0	0	1	0	0	0.89			153	
θ	----	83.0	16.	4.	25.	3.70	0	0	0	0	0	0.59			154	
θ	82.5	82.5	17.	6.	35.3	5.43	0	1	2	0	0	0.92			155	
θ	93.0	90.5	16.	4.	25.0	4.50	0	1	1	0	0	0.72			156	
θ	85.5	84.0	17.	5.	29.5	4.54	0	0	0	0	1	0.77			157	
θ	87.5	87.5	17.	4.	23.7	4.54	0	1	1	0	0	0.77			158	
θ	----	75.0	18.	6.	33.3	4.28	0	0	1	1	1	0.77			159	
θ	----	85.0	15.	5.	33.3	4.34	0	0	0	1	1	0.65			160	
θ	85.0	85.0	16.	3.	18.8	4.07	0	0	1	0	0	0.65			161	
θ	----	86.0	16.	5.	31.3	4.07	0	0	0	1	1	0.65			162	
θ	83.0	83.0	16.	5.	31.3	4.07	0	0	0	1	1	0.65			163	
θ	----	77.5	16.	5.	31.3	3.26	0	0	1	0	0	0.52			164	
θ	85.5	85.5	16.	5.	31.3	4.26	0	0	0	1	2	0.68			165	
θ	87.0	87.0	16.	5.	31.3	5.14	0	2	0	1	1	0.82			166	
θ	----	74.0	16.	5.	31.3	3.33	0	0	0	1	0	0.53			167	
θ	----	93.0	15.	3.	20.0	3.54	0	0	0	1	1	0.53			168	
θ	----	88.0	15.	2.	13.4	3.94	0	0	0	1	1	0.59			169	
θ	88.0	88.0	15.	3.	20.0	3.94	0	0	1	1	1	0.59			170	
θ	81.5	74.0	16.	5.	31.3	4.26	0	0	0	1	1	0.68			171	
θ	86.0	86.0	16.	5.	31.3	4.44	0	0	1	0	0	0.71			172	
θ	76.5	76.5	17.	6.	35.3	4.18	0	0	0	1	1	0.71			173	
θ	90.5	90.5	15.	3.	20.0	3.47	0	0	0	1	2	0.52			174	
θ	----	88.5	15.	3.	20.0	3.68	0	0	0	1	2	0.55			175	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
θ	87.5	87.5	14.	3.	21.5	4.00	0	0	0	1	1	0.56			176	
θ	90.0	83.5	15.	4.	26.7	2.62	0	0	1	1	0	0.39			177	
θ	----	86.0	15.	4.	26.7	2.62	0	0	1	0	0	0.39			178	
θ	77.0	77.0	16.	5.	31.3	4.00	0	0	0	0	0	0.64			179	
θ	75.0	75.0	15.	5.	33.3	2.81	0	0	1	2	0	0.42			180	
θ	----	76.0	15.	6.	40.0	3.08	0	0	1	1	1	0.46			181	
θ	86.5	82.5	14.	4.	28.7	3.00	0	0	1	1	0	0.42			182	
θ	----	80.0	14.	3.	21.5	1.64	0	0	0	1	0	0.23			183	
θ	80.0	80.0	14.	5.	35.8	2.43	0	0	0	1	0	0.34			184	
θ	80.0	80.0	12.	3.	25.0	2.00	0	0	0	1	1	0.24			185	
θ	----	83.5	13.	3.	23.2	1.85	0	0	0	0	0	0.24			186	
θ	83.5	83.5	13.	3.	23.2	2.32	0	0	0	1	0	0.30			187	
θ	74.0	74.0	13.	4.	30.8	1.55	0	0	0	1	0	0.20			188	

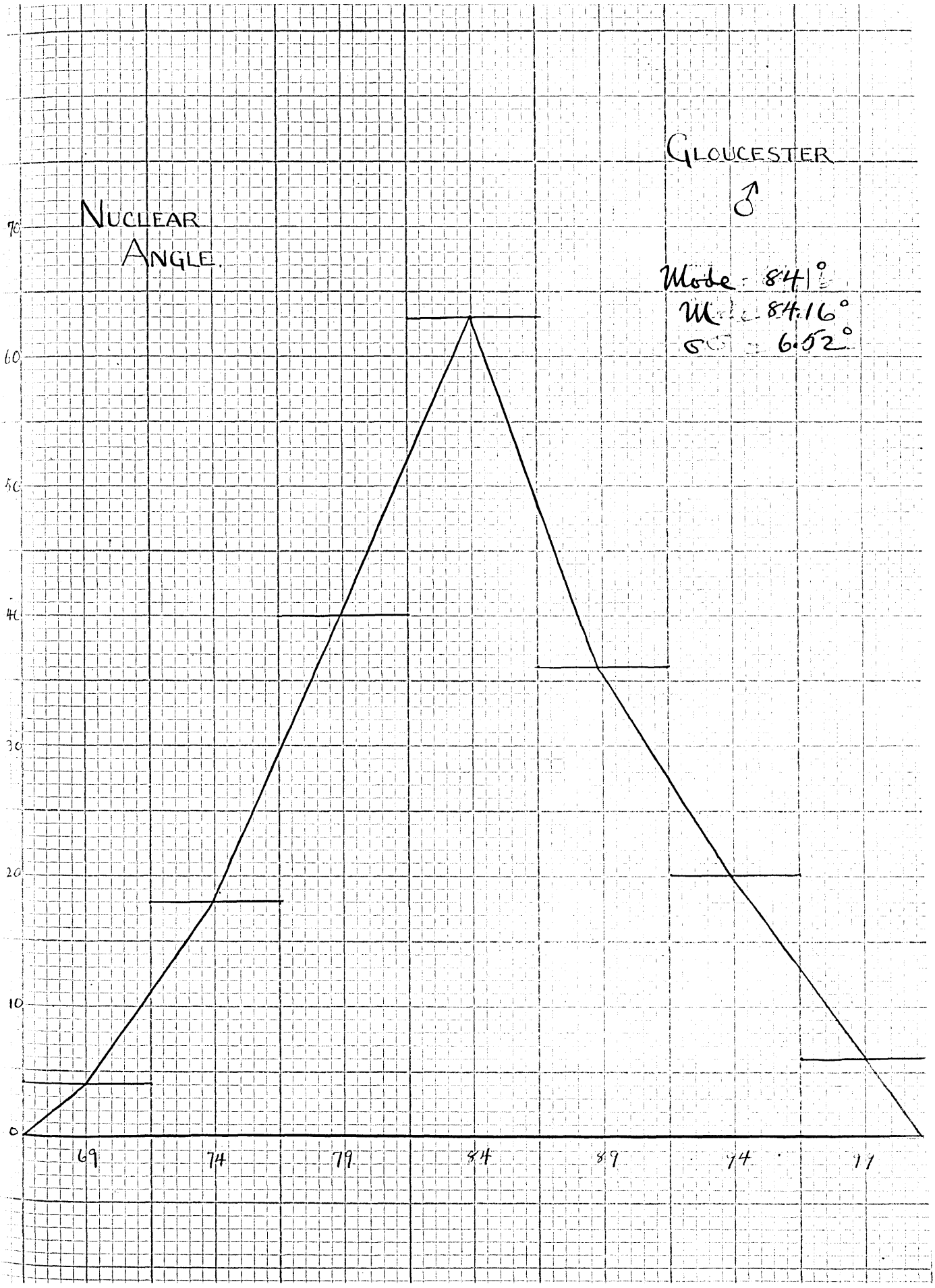
Seriation of Data A.

Locality, Gloucester. Males.

Nuclear Lengths.

1	65.5	76.5	80	82.5	84.5	86	89	92
2	68.5	76.5	80	82.5	84.5	86	89	92
3	68.5	77	80	82.5	84.5	86	89	93
4	70.5	77	80	82.5	84.5	86	89	93
5	72	77	80	83	85	86	89	93.5
6	72	77	80	83	85	86.5	89.5	93.5
7	72.5	77.5	80	83	85	86.5	89.5	94
8	73	77.5	80.5	83.5	85	86.5	90	94
9	73	78	80.5	83.5	85	86.5	90	94.5
10	73.5	78	81	83.5	85	86.5	90	94.5
11	74	78	81	83.5	85	86.5	90	94.5
12	74	78	81	83.5	85	86.5	90	95.5
13	74	78	81	84	85	86.5	90	96
14	74.5	78.5	81	84	85	86.5	90.5	96.5
15	74.5	78.5	81.5	84	85	87	91	96.5
16	75	78.5	81.5	84	85	87	91	96.5
17	75.5	78.5	81.5	84	85	87	91	98.5
18	75.5	79	81.5	84	85.5	87	91.5	100.
19	76	79	82	84	85.5	87.5	91.5	101.
20	76	79	82	84	85.5	87.5	91.5	
21	76	79.5	82	84	85.5	87.5	92	
22	76	79.5	82	84	85.5	87.5	92	
23	76.5	79.5	82.5	84	85.5	87.5	92	
24	76.5	80	82.5	84.5	85.5	88	92	

Classes	69-71	72-76	77-81	82-86	87-91	92-96	97-101
	69	74	79	84	89	94	99
Frequency	4	18	40	63	36	20	6


GLOUCESTER
♂
NUCLEAR
ANGLE.
Mode - 84°
M - 84.16°
SD - 6.52°
70
60
50
40
30
20
10
0
69
74
79
84
89
94
11

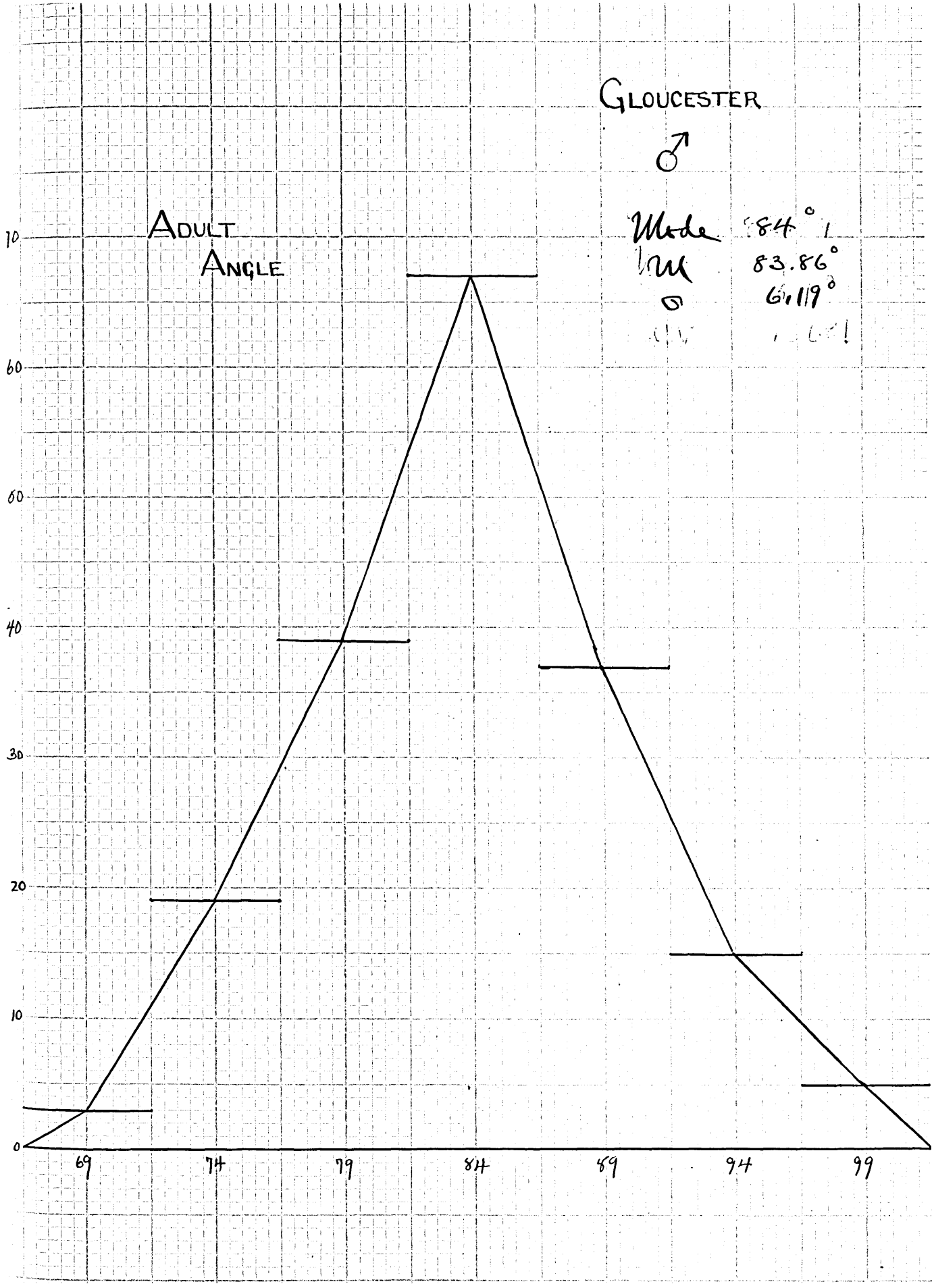
Locality. Gloucester ♂

Seriation of Data

Adult Angle

1	67.5	76.5	80.	82.5	84.	86.	87.5	91.5
2	68.5	76.5	80.	82.5	84.	86.	87.5	92.
3	70.5	76.5	80.	82.5	84.5	86.	87.5	92.
4	72.	76.5	80.	82.5	84.5	86.	87.5	93.
5	72.5	76.5	80.	82.5	84.5	86.	88.	93.5
6	72.5	77.	80.5	82.5	84.5	86.	88.	94.
7	72.5	77.	80.5	82.5	84.5	86.	88.5	94.
8	73.5	77.	81.	83.	84.5	86.	88.5	94.
9	74.	77.5	81.	83.	84.5	86.5	89.	94.5
10	74.	77.5	81.	83.	85.	86.5	89.	95.
11	74.	77.5	81.	83.	85.	86.5	89.	95.5
12	75.	78.	81.	83.5	85.	86.5	89.	96.
13	75.	78.	81.	83.5	85.	86.5	89.5	96.5
14	75.	78.	81.5	83.5	85.	86.5	90.	96.5
15	75.5	78.	81.5	83.5	85.	86.5	90.	96.5
16	75.5	78.5	81.5	83.5	85.	86.5	90.	100.
17	76.	78.5	82.	83.5	85.	87.	90.	101.
18	76.	79.	82.	83.5	85.	87.	90.5	
19	76.	79.	82.	84.	85.	87.	90.5	
20	76.	79.	82.	84.	85.5	87.	91.	
21	76.	79.	82.	84.	85.5	87.5	91.	
22	76.	79.5	82.5	84.	85.5	87.5	91.5	
23	76.5	79.5	82.5	84.	85.5	87.5	91.5	
24	76.5	80.	82.5	84.	85.5	87.5	91.5	

Classes	67-71 69	72-76 74	77-81 79	82-86 84	87-91 89	92-96 94	97-101 99
Frequency	3	19	39	67	37	15	5


GLOUCESTER
♂
ADULT
ANGLE
Mode 84°
Mean 83.86°
σ 6.119°
70
60
50
40
30
20
10
0
69
74
79
84
89
94
99

Locality. Gloucester 61

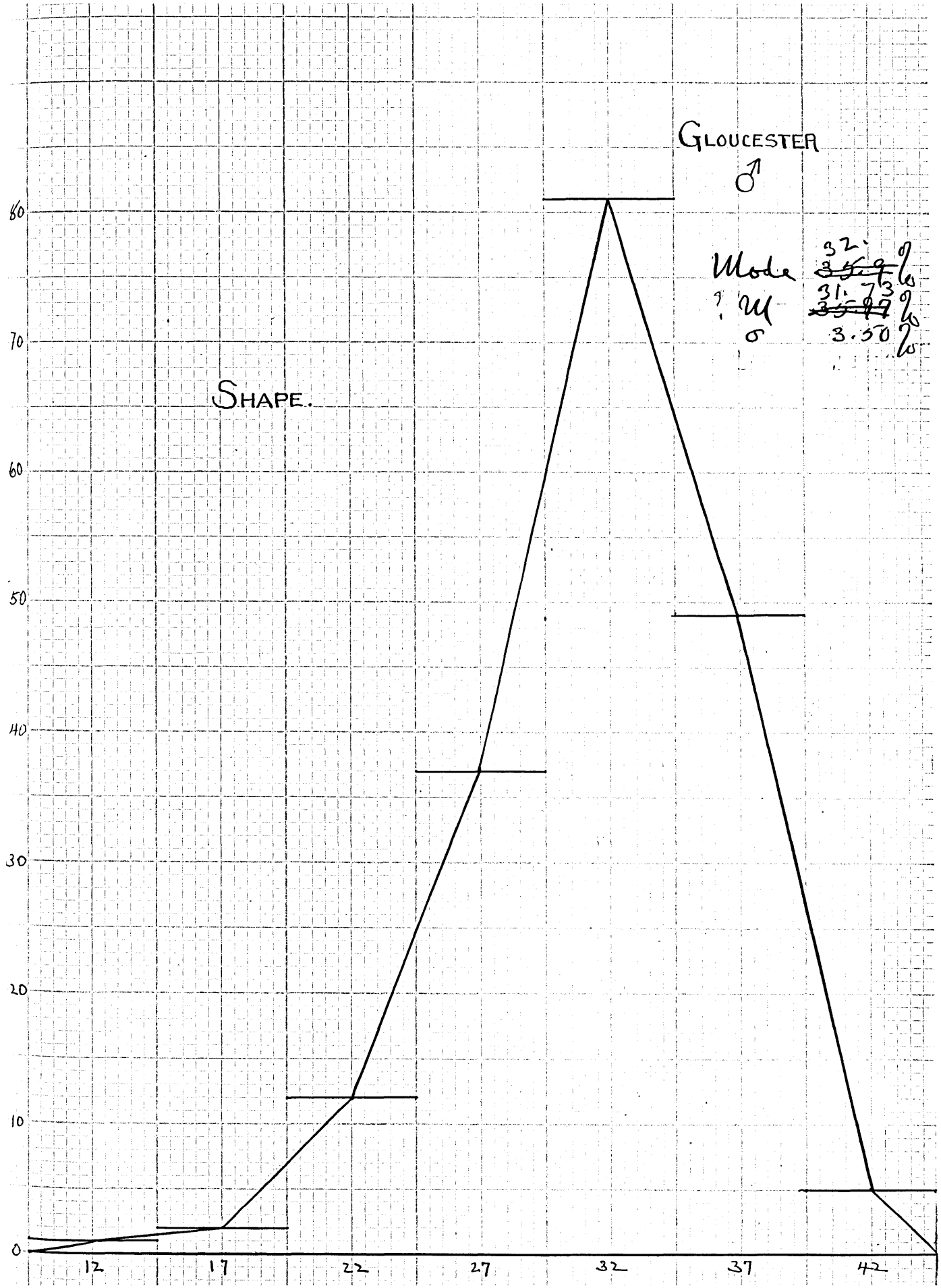
C.

Seriation of Data

Shape

1	13.4	26.3	29.4	31.3	31.9	33.3	35.	37.8
2	18.8	26.4 26.7	29.4	31.3	31.9	33.3	35.	38.
3	18.8	26.7	29.4	31.3	31.9	33.3	35.3	38.
4	20.	26.8	29.5	31.3	31.9	33.3	35.3	38.1
5	20.	26.8	29.6	31.3	32.6	33.3	35.3	38.1
6	20.	26.9	29.6	31.3	32.7	33.3	35.3	38.1
7	20.	27.3	29.6	31.3	32.7	33.3	35.3	38.2
8	21.5	27.3	29.6	31.3	33.3	33.3	35.3	38.6
9	21.5	27.8	30.	31.3	33.3	33.3	35.7	38.7
10	23.2	27.8	30.	31.3	33.3	33.3	35.8	38.9
11	23.2	27.8	30.	31.3	33.3	34.2	36.4	39.
12	23.7	27.8	30.	31.3	33.3	34.3	36.5	39.
13	23.8	27.8	30.	31.7	33.3	34.8	36.8	39.
14	23.8	27.9	30.	31.3	33.3	34.8	36.9	40.
15	23.8	28.1	30.	31.7	33.3	34.8	36.9	40.
16	25.	28.6	30.	31.7	33.3	35.	36.9	40.
17	25.	28.7	30.	31.7	33.3	35.	36.9	41.3
18	25.	28.7	30.4	31.7	33.3	35.	36.9	41.3
19	25.	28.7	30.4	31.7	33.3	35.	36.9	
20	25.	29.2	30.4	31.7	33.3	35.	36.9	
21	25.	29.4	30.5	31.7	33.3	35.	36.9	
22	25.	29.4	30.8	31.7	33.3	35.	36.9	
23	25.1	29.4	31.0	31.7	33.3	35.	37.5	
24	26.3	29.4	31.3	31.9	33.3	35.	37.8	

Classes	10-14 (12)	15-19 (17)	20-24 (22)	25-29 (27)	30-34 (32)	35-39 (37)	40-44 (42)
Frequency	1	2	12	37	81	49	5


GLOUCESTER
♂
Mode 32.
σ 3.50
SHAPE.
80
70
60
50
40
30
20
10
0
12
17
22
27
32
37
42

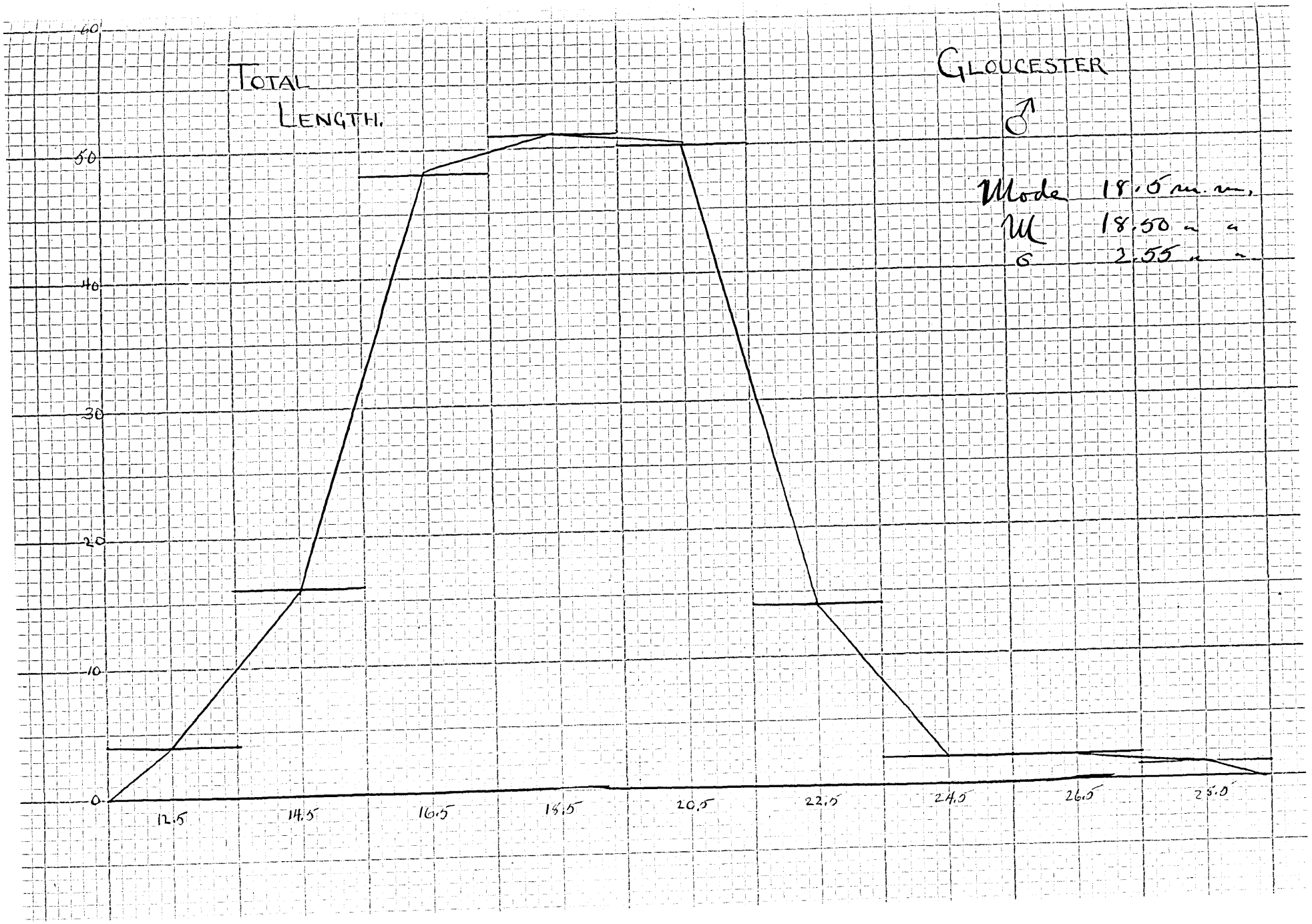
locality- Gloucester ♂

Seriation of Data

Total length.

1	12	16	17	18	19	20	21	21	
2	13	16	17	18	19	20	21	21.5	
3	13	16	17	18	19	20	21	22	
4	13	16	17	18	19	20	21	22	
5	14	16	17	18	19	20	21	22	
6	14	16	17	18	19	20	21	22	
7	14	16	17	18	19	20	21	22	
8	14	16	17	18	19	20	21	22	
9	15	16	17	18	19	20	21	22	
10	15	16	17	18	19	20	21	23	
11	15	16	17	18	19	20	21	23	
12	15	16	17	18	19	20	21	23	
13	15	16	17	18	19	20	21	23	
14	15	16	17	18	19	20	21	23	
15	15	16	17	18	19	20	21	24	
16	15	16	17	18	19	20	21	25	
17	15	16	17	18	19	20	21	26	
18	15	16	17	18	19	20	21	26	
19	15	16	17	18	19	20	21	29	
20	15	16.5	17	18	19	20	21		
21	16	16.5	18	18	19	20	21		
22	16	16.5	18	18.5	19	20	21		
23	16	16.5	18	18.5	19	20	21		
24	16	17	18	19	19.5	20.5	21		

Classes	12-13	14-15	16-17	18-19	20-21	22-23	24-25	26-27	28-29
Frequency	4	16	48	51	50	14	2	2	


TOTAL
LENGTH.
GLOUCESTER
♂
Mode 18.5 m.m.
M 18.50 " "
σ 2.55 " "
60
50
40
30
20
10
0
12.5
14.5
16.5
18.5
20.5
22.5
24.5
26.5
28.5

Locality. Gloucester ♂

Seriation of Data

Imbrications

Classes	0	1	2
Frequency	187	1	0

Teeth

Classes	0	1	2
Frequency	123	47	18

Columella

Classes	0	1	2	3
Frequency	57	108	23	0

Sutures

Classes	0	1	2
Frequency	111	76	1

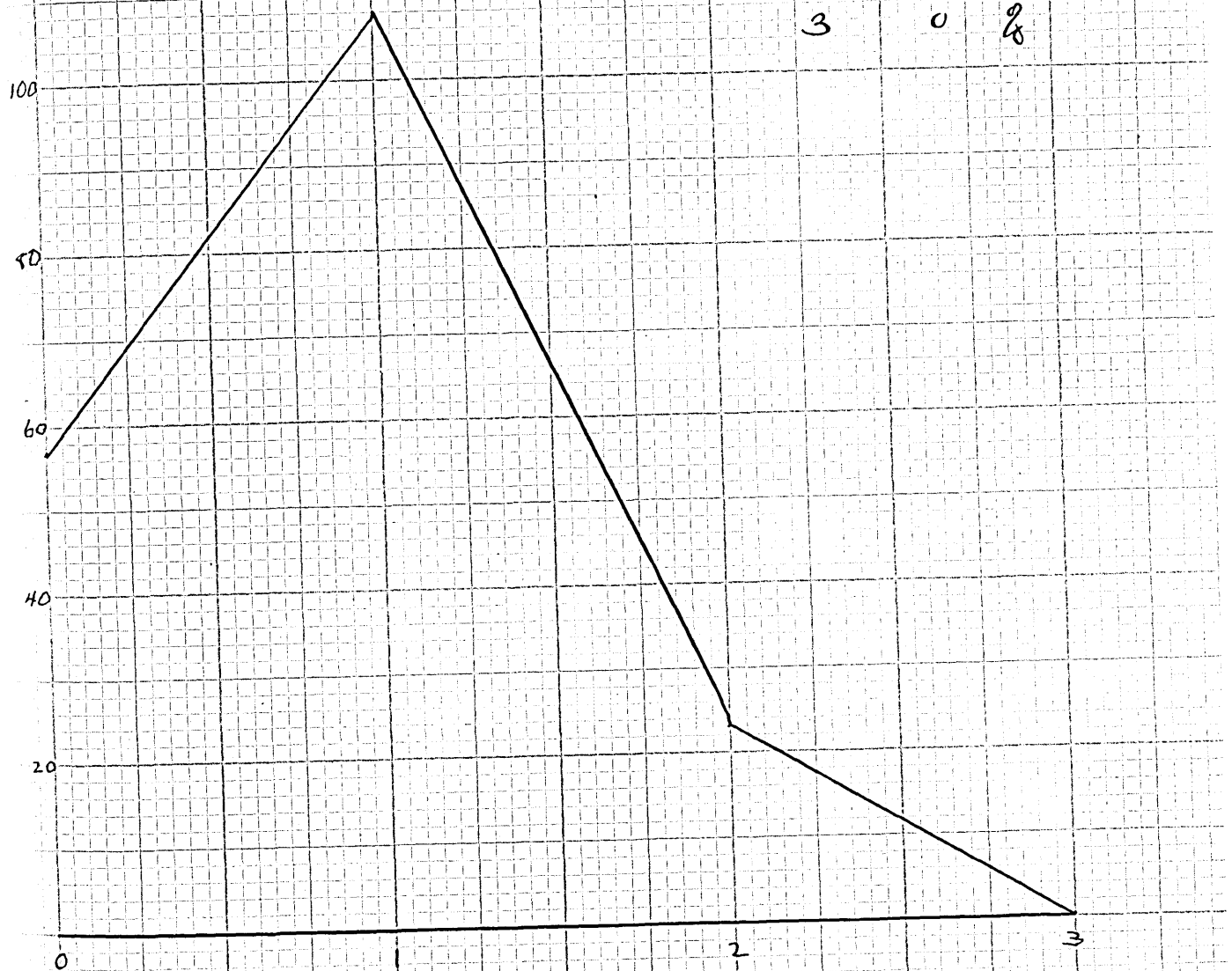
Ribs

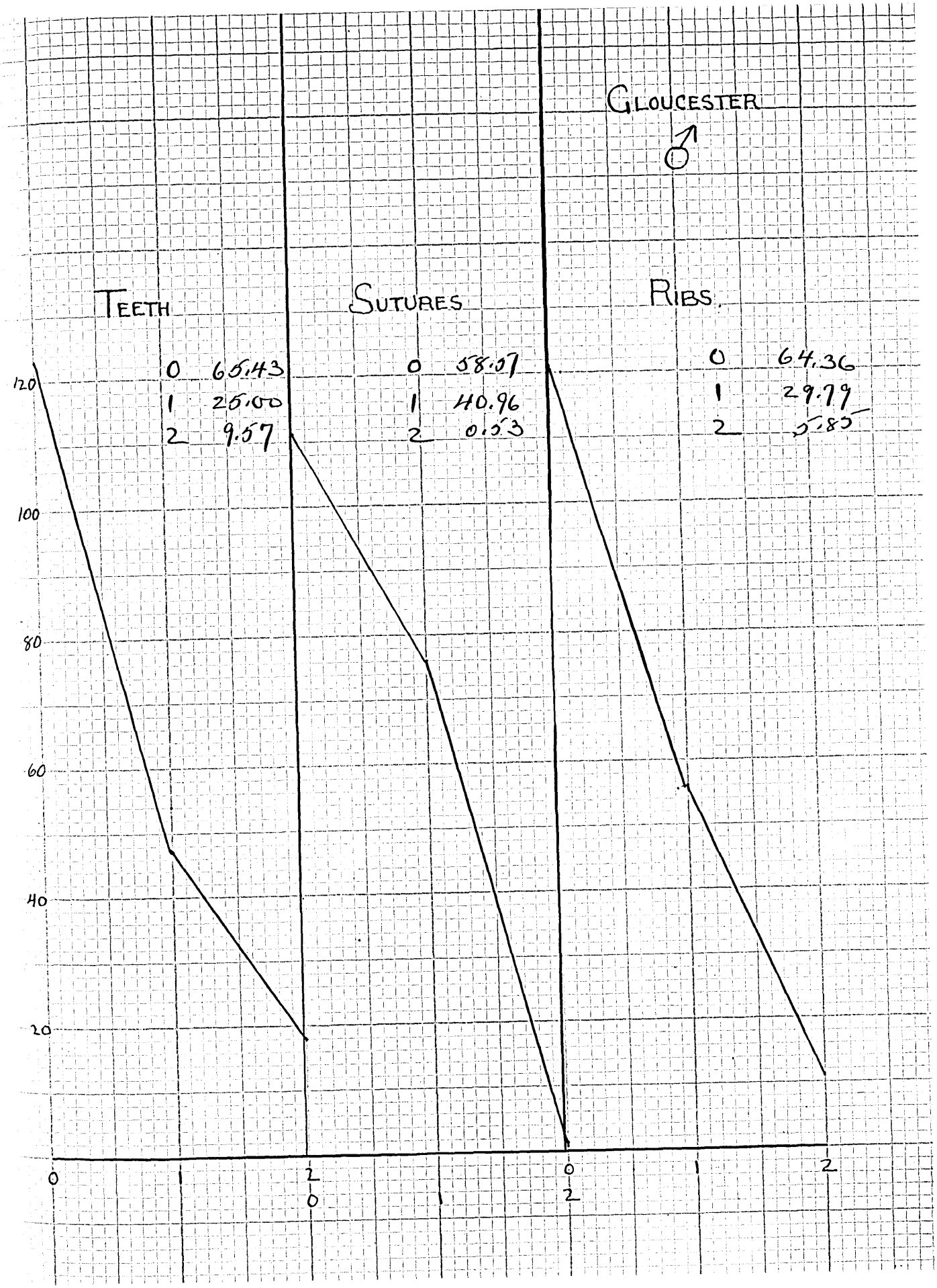
Classes	0	1	2
Frequency	121	56	11

COLUMELLA

GLOUCESTER ♂

0	30.32 %
1	56.91 %
2	12.77 %
3	0 %




GLOUCESTER
♂
TEETH
0 65.43
1 25.00
2 9.57
SUTURES
0 58.37
1 40.96
2 0.53
RIBS
0 64.36
1 29.79
2 5.85
120
100
80
60
40
20
0
1
2
0
1
2
0
1
2

COLLECTION NO. 7.

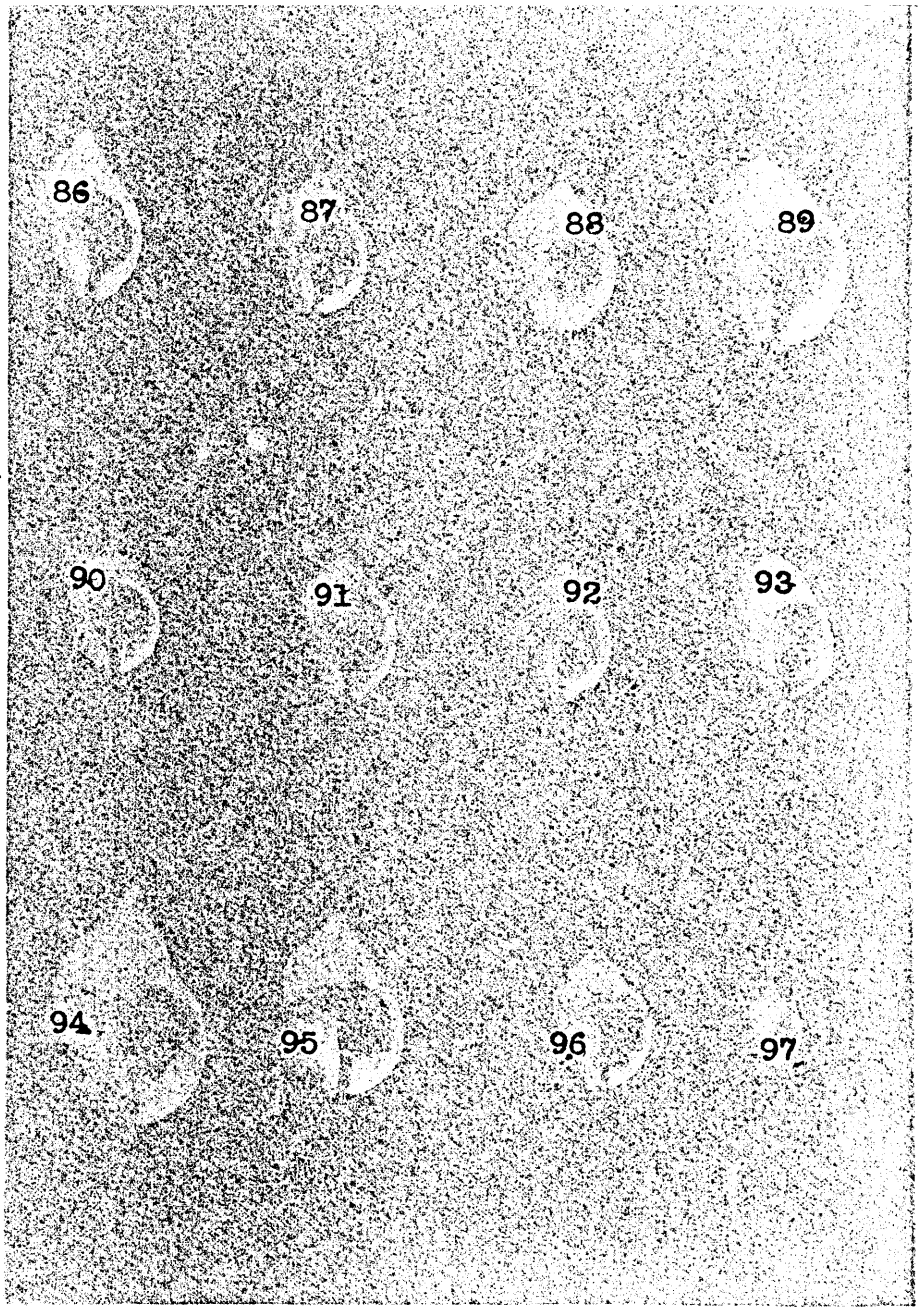
FEMALE SHELLS FROM GLOUCESTER.

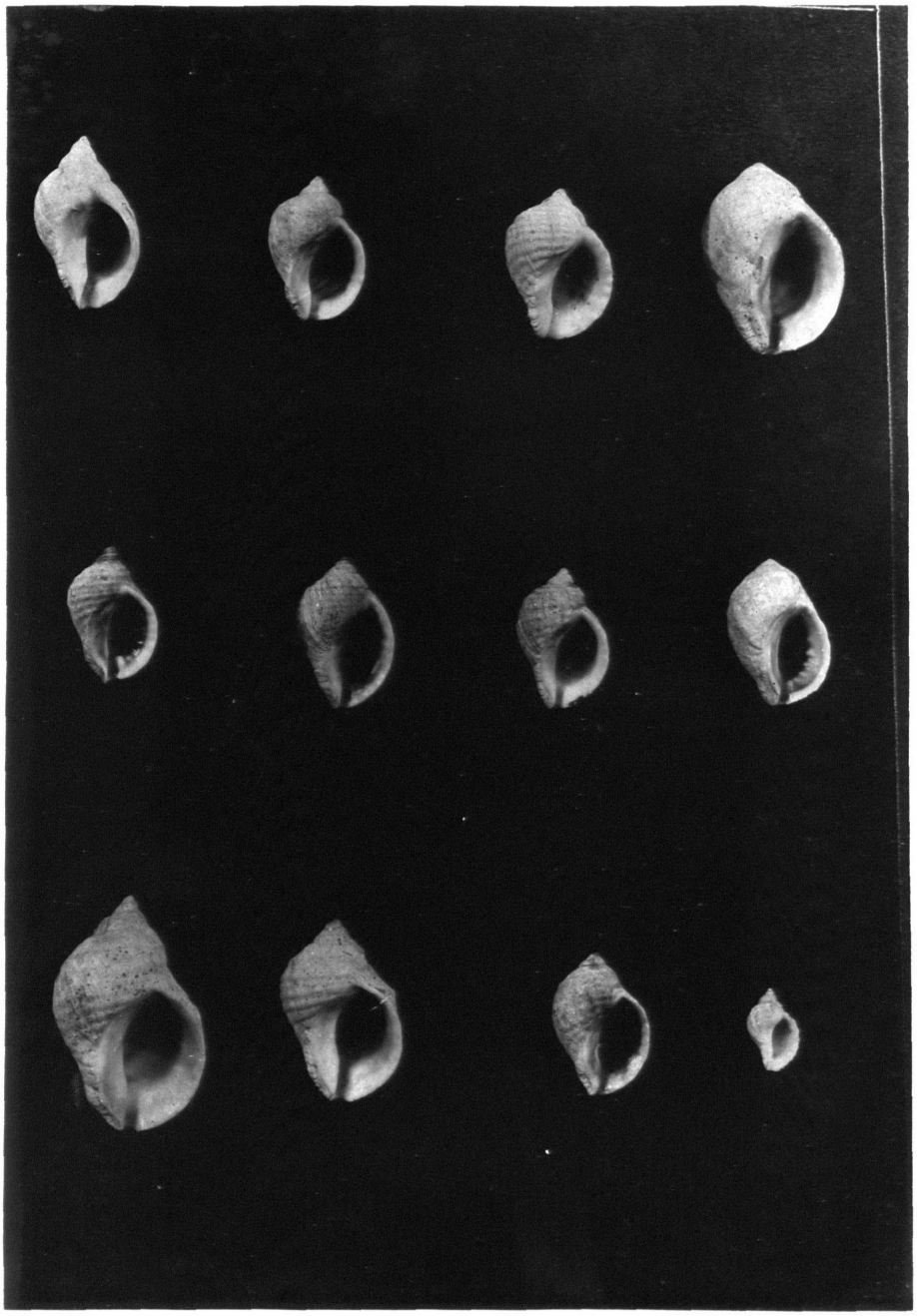
176 SPECIMENS.

PLATE XI.

GLOUCESTER. Females.

Figs.	86-89	Nuclear Angle.
"	90-93	Adult "
"	94-97	Total Length.


86
87
88
89
90
91
92
93
94
95
96
97



Locality, Gloucester. Females. Measurements. 1.

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	89.0	84.5	22.	6.	27.3	8.65	0	0	1	0	1	1.90			1
♀	----	95.0	23.	6.	26.2	11.1	0	1	1	0	0	2.55			2
♀	87.5	87.5	24.	6.	25.0	11.8	0	1	2	0	0	2.82			3
♀	78.5	78.5	22.	7.	31.9	9.71	0	0	2	0	0	2.13			4
♀	88.0	88.0	23.	7.	30.5	9.45	0	0	1	1	0	2.17			5
♀	80.0	80.0	25.	9.	36.1	13.7	0	0	1	0	0	3.43			6
♀	95.5	95.5	22.5	6.	26.8	10.4	0	0	2	0	0	2.33			7
♀	95.0	90.0	21.	5.	23.8	7.72	0	0	0	0	1	1.62			8
♀	88.0	88.0	20.5	6.	29.3	7.93	0	0	0	0	1	1.62			9
♀	80.0	80.0	22.	7.	31.9	7.97	0	0	1	0	1	1.75			10
♀	96.5	96.5	20.	6.	30.0	9.89	0	1	1	0	0	1.97			11
♀	93.5	81.5	22.	7.	31.9	10.3	0	0	2	0	0	2.25			12
♀	85.0	75.0	25.	9.	36.1	14.2	0	1	1	0	0	3.53			13
♀	91.0	91.0	20.5	5.	24.4	8.35	0	0	1	0	1	1.71			14
♀	82.5	82.5	21.5	6.	27.9	7.64	0	0	1	0	0	1.64			15
♀	81.5	81.5	22.	7.	31.9	7.60	0	0	1	0	0	1.67			16
♀	80.5	80.5	21.	7.	33.3	6.51	0	0	1	0	0	1.37			17
♀	87.0	84.0	21.5	7.	30.7	8.50	0	0	1	0	0	1.82			18
♀	----	80.0	21.	6.	28.7	7.54	0	0	1	0	0	1.58			19
♀	81.5	81.5	22.	7.	31.9	8.75	0	1	2	0	1	1.94			20
♀	91.0	91.0	21.	6.	28.7	6.66	0	1	2	0	0	1.40			21
♀	91.0	91.0	22.	7.	31.9	9.78	0	1	2	0	0	2.15			22
♀	80.0	80.0	21.	7.	30.0	8.68	0	0	1	0	0	1.82			23
♀	103.	103.	19.	6.	31.7	9.80	0	1	0	0	0	1.86			24
♀	92.0	92.0	20.	6.	30.0	8.21	0	0	1	0	0	1.64			25

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	97.5	97.5	20.	5.	25.0	9.00	0	1	0	0	0	1.80			26
♀	92.0	92.0	20.	6.	30.0	6.65	0	1	0	0	0	1.33			27
♀	103.	90.	25.	6.	24.1	16.9	0	0	0	0	0	4.21			28
♀	77.5	77.5	28.	10.	35.7	12.0	0	0	2	0	0	3.34			29
♀	90.0	90.0	24.	6.	25.0	9.73	0	0	2	0	0	2.33			30
♀	----	87.0	25.	7.	28.0	9.93	0	0	0	0	1	2.47			31
♀	75.5	75.5	24.	5.	20.8	9.38	0	0	0	0	2	2.25			32
♀	86.5	78.5	22.5	7.	31.2	9.22	0	0	2	1	0	2.07			33
♀	81.0	80.0	23.	7.	30.5	10.0	0	0	1	0	0	2.29			34
♀	----	87.5	22.	7.	31.9	7.93	0	0	1	0	0	1.74			35
♀	80.0	80.0	23.	7.	30.5	10.0	0	2	1	0	0	2.32			36
♀	89.0	83.0	24.	6.	25.0	11.4	0	0	0	0	1	2.73			37
♀	93.5	93.5	18.	5.	27.8	6.45	0	0	2	0	0	1.16			38
♀	----	89.0	20.	6.	30.0	8.33	0	0	1	0	0	1.66			39
♀	87.0	87.0	22.	6.	27.3	6.96	0	0	1	0	0	1.53			40
♀	81.0	81.0	22.	7.	31.9	9.00	0	1	1	0	0	1.98			41
♀	86.0	86.0	20.	6.	30.0	7.50	0	2	1	0	0	1.50			42
♀	84.0	84.0	20.	6.	30.0	8.29	0	1	1	0	0	1.65			43
♀	89.0	89.0	19.	6.	31.7	8.42	0	1	1	0	0	1.60			44
♀	86.0	86.0	20.5	6.	29.3	6.65	0	0	2	0	0	1.36			45
♀	90.0	90.0	21.5	7.	30.7	8.95	0	0	0	0	0	1.92			46
♀	87.5	87.5	21.	6.	28.7	7.76	0	0	1	0	0	1.63			47
♀	99.0	99.0	21.	5.	23.8	7.26	0	0	1	0	0	1.52			48
♀	84.5	84.5	22.5	7.	31.2	8.50	0	1	2	0	0	1.91			49
♀	87.0	87.0	22.5	7.	31.2	11.7	0	1	2	0	2	2.63			50

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
♀	----	87.5	20.	6.	30.0	8.08	0	1	1	0	1	1.61			51	
♀	73.0	68.5	23.	8.	34.8	8.45	0	0	0	0	0	1.94			52	
♀	92.0	89.0	20.	5.	25.0	9.70	0	2	0	0	0	1.93			53	
♀	82.5	82.5	22.	7.	31.9	8.51	0	0	1	0	0	1.87			54	
♀	78.0	78.0	21.	7.	33.3	7.64	0	0	1	0	0	1.60			55	
♀	83.5	80.0	22.	6.	27.3	9.78	0	0	1	0	0	2.15			56	
♀	77.5	77.5	22.	8.	36.3	7.94	0	0	0	0	0	1.84			57	
♀	94.0	94.0	21.	7.	33.3	10.5	0	0	2	0	0	2.22			58	
♀	78.5	78.5	22.	8.	36.3	7.33	0	0	0	1	1	1.61			59	
♀	90.5	90.5	22.	7.	31.9	7.70	0	0	1	0	0	1.69			60	
♀	96.0	96.0	19.	5.	26.3	7.33	0	0	0	1	1	1.39			61	
♀	93.5	93.5	21.	5.	23.8	7.31	0	0	1	0	0	1.53			62	
♀	83.5	77.0	22.	8.	36.3	7.84	0	1	1	0	0	1.72			63	
♀	----	91.0	19.	5.	26.3	5.80	0	0	0	0	1	1.10			64	
♀	91.0	91.0	22.5	7.	31.2	9.35	0	0	2	0	0	2.10			65	
♀	73.0	73.0	21.	7.	33.3	7.88	0	0	0	0	0	1.65			66	
♀	84.0	84.0	21.	6.	28.7	7.15	0	0	1	0	1	1.50			67	
♀	----	86.0	21.	6.	28.7	8.67	0	0	1	0	1	1.82			68	
♀	75.0	75.0	20.	7.	35.0	7.71	0	0	1	0	0	1.54			69	
♀	99.0	99.0	19.	5.	26.3	6.80	0	0	1	0	0	1.29			70	
♀	86.0	79.0	21.	6.	28.7	9.25	0	1	1	0	0	1.94			71	
♀	96.0	96.0	20.	5.	25.0	7.50	0	0	0	0	1	1.50			72	
♀	96.0	96.0	18.	5.	27.8	8.00	0	1	2	0	0	1.44			73	
♀	82.5	82.5	19.	6.	31.7	6.28	0	1	1	0	0	1.19			74	
♀	91.0	88.0	19.	5.	26.3	8.43	0	0	1	0	0	1.60			75	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight	No.
♀	87.5	87.5	21.	7.	33.3	9.05	0	0	0	0	0	1.90	76
♀	93.0	93.0	20.	5.	25.0	7.89	0	0	1	0	0	1.57	77
♀	82.0	82.0	21.	8.	38.1	7.15	0	0	0	0	1	1.50	78
♀	----	85.0	20.	6.	30.0	6.45	0	0	0	1	1	1.29	79
♀	86.0	86.0	19.	6.	31.7	6.30	0	0	0	0	0	1.20	80
♀	83.0	81.0	19.	5.	26.3	6.50	0	0	1	0	0	1.24	81
♀	90.0	90.0	18.	5.	27.8	5.80	0	0	0	0	0	1.04	82
♀	----	80.5	21.	7.	33.3	7.94	0	1	2	0	1	1.66	83
♀	82.0	82.0	19.	6.	31.7	6.59	0	0	1	0	0	1.25	84
♀	89.0	86.0	17.	5.	29.5	5.18	0	0	0	0	0	0.88	85
♀	----	76.0	19.	6.	31.7	5.52	0	0	0	1	0	1.05	86
♀	95.0	95.0	18.	5.	27.8	6.20	0	0	2	0	0	1.05	87
♀	85.5	85.5	19.	5.	26.3	5.52	0	0	0	0	0	1.05	88
♀	92.0	92.0	18.	5.	27.8	5.74	0	1	1	0	0	1.03	89
♀	----	78.0	20.	7.	35.0	7.07	0	0	1	1	1	1.41	90
♀	79.0	79.0	20.	6.	30.0	5.90	0	0	1	1	0	1.18	91
♀	----	97.5	17.	4.5	26.6	5.48	0	0	1	0	0	0.93	92
♀	90.0	90.0	18.	6.	33.3	5.40	0	0	1	0	0	0.97	93
♀	85.0	85.0	18.	6.	33.3	5.67	0	0	0	0	0	1.02	94
♀	90.0	90.0	18.	5.	27.8	6.45	0	0	1	0	0	1.16	95
♀	93.0	93.0	18.	5.	27.8	5.83	0	0	1	0	0	1.05	96
♀	78.0	78.0	20.	6.	30.0	6.00	0	0	0	1	0	1.20	97
♀	83.0	83.0	19.	5.	26.3	4.38	0	0	0	1	0	0.83	98
♀	83.0	83.0	18.	6.	33.3	5.23	0	0	0	1	0	0.94	99
♀	----	81.0	16.5	5.	30.3	4.54	0	0	1	0	2	0.75	100

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.	
♀	76.5	76.5	19.	6.	31.7	5.60	0	0	1	0	1	1.06			101	
♀	85.0	85.0	19.	5.	26.3	5.60	0	0	0	0	0	1.06			102	
♀	84.0	84.0	20.	5.	25.	5.81	0	0	1	0	1	1.16			103	
♀	80.0	80.0	20.	6.	30.0	6.40	0	0	0	1	2	1.28			104	
♀	83.0	83.0	20.	6.	30.0	6.00	0	0	1	0	0	1.20			105	
♀	92.0	92.0	16.5	5.	30.3	4.50	0	0	2	0	0	0.74			106	
♀	87.0	87.0	17.	5.	29.5	5.48	0	0	1	0	0	0.93			107	
♀	88.0	85.0	18.	5.	27.8	5.56	0	0	0	0	0	1.00			108	
♀	93.0	87.0	17.	5.	29.5	5.24	0	0	1	0	0	0.89			109	
♀	80.0	80.0	20.	7.	35.0	5.66	0	0	1	1	0	1.13			110	
♀	----	82.5	16.	5.	31.3	3.82	0	0	0	0	1	0.61			111	
♀	----	82.5	17.	5.	29.5	4.43	0	0	0	0	0	0.75			112	
♀	75.5	75.5	18.	6.5	36.2	4.84	0	0	0	1	1	0.87			113	
♀	----	87.5	18.	5.	27.8	5.46	0	0	1	0	0	0.98			114	
♀	83.5	83.5	18.5	6.	32.5	5.30	0	0	2	0	0	0.98			115	
♀	98.5	88.0	17.	5.	29.5	5.78	0	0	1	0	0	0.98			116	
♀	----	86.5	17.	5.	29.5	5.68	0	0	1	1	2	0.96			117	
♀	77.5	75.0	20.	6.	30.0	6.21	0	0	0	1	1	1.24			118	
♀	98.0	98.0	16.5	4.	24.3	6.64	0	1	0	0	0	1.08			119	
♀	80.5	80.0	17.	5.	29.5	5.06	0	0	0	0	0	0.86			120	
♀	86.5	86.5	18.	6.	33.3	5.58	0	0	1	0	0	1.00			121	
♀	83.5	78.0	18.	5.	27.8	4.67	0	0	0	0	0	0.84			122	
♀	----	85.0	19.	6.	31.7	5.58	0	0	1	1	2	1.06			123	
♀	80.0	80.0	18.	5.	27.8	5.13	0	0	1	1	0	0.87			124	
♀	88.5	88.5	17.	5.	29.5	5.89	0	0	1	0	1	1.00			125	

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	----	79.0	17.	5.	29.5	4.47	0	0	0	1	2	0.76			126
♀	76.5	76.5	17.	5.	29.5	5.13	0	0	0	1	0	0.87			127
♀	92.0	92.0	17.	5.	29.5	5.88	0	0	1	0	1	1.00			128
♀	----	84.0	16.	6.	37.6	5.38	0	0	1	0	1	0.86			129
♀	88.5	88.5	17.	4.	23.7	5.19	0	0	0	0	0	0.88			130
♀	80.0	76.5	20.	7.	35.0	7.56	0	1	1	0	0	1.61			131
♀	84.0	82.5	17.	5.	29.5	5.30	0	0	0	0	0	0.90			132
♀	----	86.5	17.	5.	29.5	5.48	0	0	0	1	0	0.93			133
♀	----	77.5	17.	6.	35.3	5.71	0	0	0	0	2	0.97			134
♀	81.5	81.5	16.5	5.	30.5	5.28	0	0	1	0	1	0.87			135
♀	----	80.0	17.	5.	29.5	4.68	0	0	0	0	2	0.79			136
♀	87.0	87.0	16.	5.	31.3	4.80	0	0	0	0	0	0.77			137
♀	----	68.0	18.	6.	33.3	2.90	1	0	0	2	2	0.52			138
♀	83.0	83.0	17.	5.	29.5	4.37	0	0	0	0	0	0.74			139
♀	----	85.5	16.5	5.	30.5	3.83	0	0	0	1	1	0.63			140
♀	86.5	86.5	18.	5.	27.8	4.45	0	0	1	1	1	0.80			141
♀	----	93.0	15.	4.	26.7	4.28	0	0	0	0	2	0.64			142
♀	----	81.0	17.	5.	29.5	4.30	0	0	0	0	0	0.73			143
♀	89.0	89.0	16.	5.	31.3	4.00	0	0	1	1	1	0.64			144
♀	75.0	75.0	18.	5.5	30.7	4.73	0	0	1	0	1	0.85			145
♀	83.5	83.5	16.	5.	31.3	3.50	0	0	1	1	1	0.56			146
♀	93.5	93.5	15.	3.	20.0	3.87	0	0	1	1	2	0.58			147
♀	76.5	76.5	16.	4.5	28.2	3.87	0	0	1	0	0	0.62			148
♀	80.0	80.0	16.	6.	37.6	3.38	0	0	0	1	0	0.54			149
♀	----	86.5	16.	5.	31.3	3.94	0	0	1	0	1	0.63			150

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight	No.
♀	----	93.0	13.5	4.	29.7	2.23	0	0	1	0	1	0.30	151
♀	82.5	82.5	16.	5.	31.3	3.81	0	0	0	0	2	0.61	152
♀	83.0	83.0	16.	5.	31.3	3.88	0	1	1	0	0	0.62	153
♀	----	90.0	15.	4.	26.7	2.27	0	0	0	0	1	0.34	154
♀	----	82.5	15.	5.	33.3	2.61	0	0	0	0	0	0.39	155
♀	80.0	80.0	14.	6.	42.8	2.07	0	0	1	1	1	0.29	156
♀	89.5	89.5	13.	3.	23.2	2.62	0	0	0	1	2	0.34	157
♀	84.0	84.0	14.	3.	21.5	2.93	0	0	0	0	0	0.41	158
♀	86.0	86.0	14.	4.	28.7	3.22	0	0	0	1	1	0.45	159
♀	81.0	81.0	14.	6.	42.9	2.58	0	0	0	0	0	0.36	160
♀	80.5	80.5	15.	4.	26.7	2.93	0	0	0	0	2	0.44	161
♀	83.5	83.5	14.	5.	35.8	2.22	0	0	0	0	0	0.31	162
♀	73.0	73.0	14.	4.	28.7	2.79	0	0	0	1	0	0.39	163
♀	86.5	86.5	13.	3.	23.2	2.62	0	0	0	0	1	0.34	164
♀	78.5	78.5	14.	3.	21.5	2.65	0	0	0	0	1	0.37	165
♀	87.0	87.0	14.	4.	28.7	1.79	0	0	0	0	2	0.25	166
♀	----	92.5	12.5	2.	16.1	2.00	0	0	0	0	0	0.25	167
♀	91.5	91.5	13.	3.	23.2	2.47	0	0	0	0	0	0.32	168
♀	73.5	73.5	14.	4.5	32.2	2.37	0	0	1	0	1	0.33	169
♀	----	80.0	13.	4.	30.8	1.85	0	0	0	1	1	0.24	170
♀	85.0	85.0	13.	3.5	27.0	2.08	0	0	0	1	1	0.27	171
♀	----	85.0	12.5	3.	24.2	1.69	0	0	0	1	2	0.21	172
♀	----	80.5	13.	4.	30.8	1.62	0	0	0	0	0	0.21	173
♀	84.0	84.0	12.	2.	16.7	1.76	0	0	1	0	0	0.21	174
♀	----	87.0	11.	3.	27.3	1.19	0	0	0	0	0	0.13	175
♀	75.0	75.0	11.	2.	18.2	1.00	0	0	0	1	1	0.11	176

A.

Locality, Gloucester, Females.

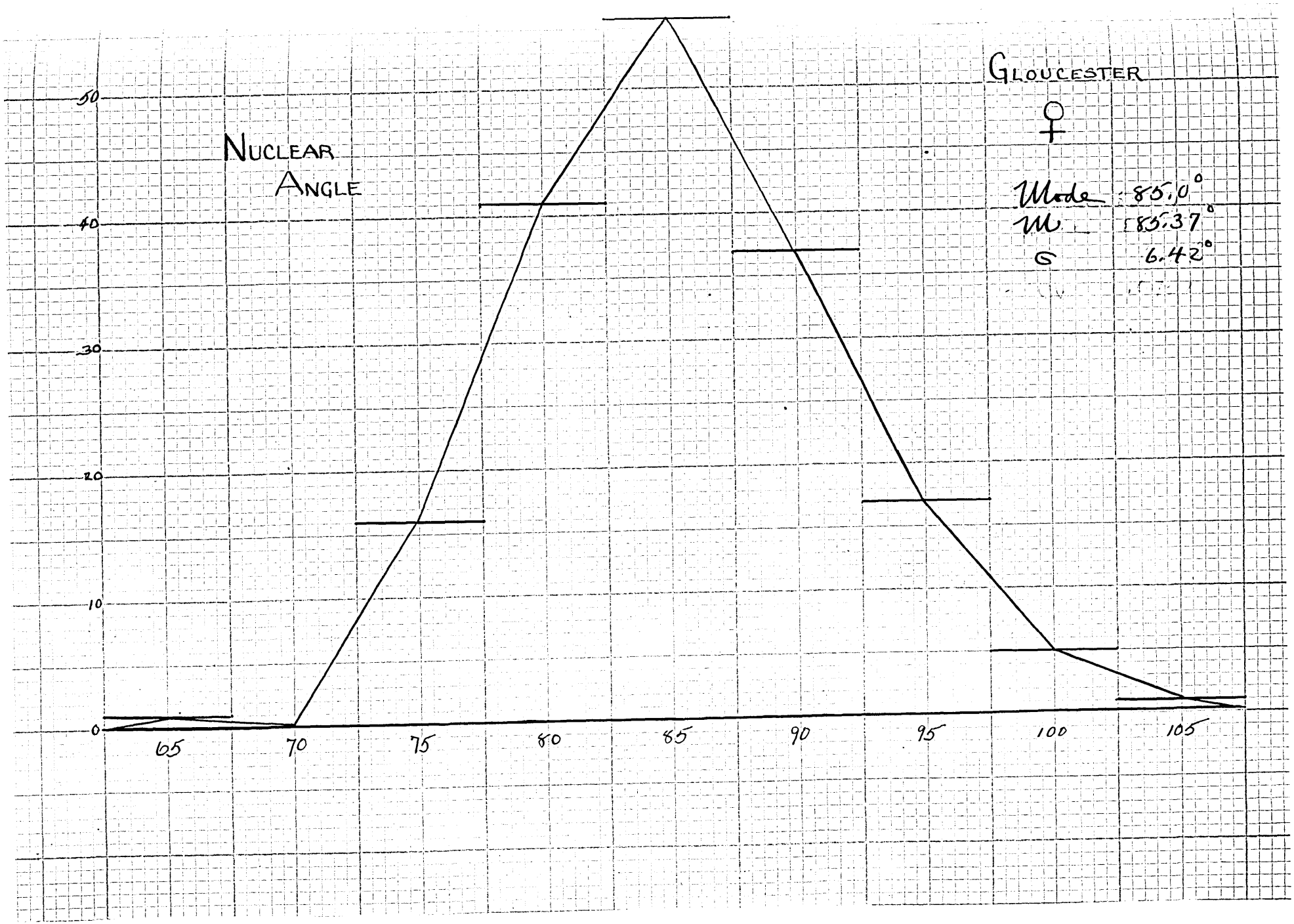
Seriation of Data

Nuclear Angle.

	6.6.							
1	73.	78.	80.5	83.	85.	87.	90.	93.5
2	73.	78.	80.5	83.	85.	87.	90.	93.5
3	73.	78.5	80.5	83.	85.	87.	90.5	93.5
4	73.5	78.5	80.5	83.	85.	87.5	90.5	93.5
5	74.	78.5	81.	83.5	85.	87.5	91.	94.
6	75.	78.5	81.	83.5	85.5	87.5	91.	95.
7	75.	78.5	81.	83.5	85.5	88.	91.	95.
8	75.	79.	81.5	83.5	85.5	88.	91.	95.5
9	75.5	79.	81.5	83.5	85.5	88.	91.	95.5
10	75.5	79.	81.5	83.5	86.	88.	91.	96.
11	75.5	80.	82.	83.5	86.	88.5	91.	96.
12	76.	80.	82.	84.	86.	88.5	91.5	96.
13	76.5	80.	82.	84.	86.	89.	92.	96.5
14	76.5	80.	82.5	84.	186.	89.	92.	97.5
15	76.5	80.	82.5	84.	86.5	89.	92.	98.
16	77.	80.	82.5	84.	86.5	89.	92.	98.5
17	77.5	80.	82.5	84.	86.5	89.	92.	99.
18	77.5	80.	83.	84.	86.5	89.	92.	99.
19	77.5	80.	83.	84.5	87.	89.5	93.	103.
20	78.	80.	83.	84.5	87.	90.	93.	103.
21	78.	80.5	83.	84.5	87.	90.	93.	
22	78.	80.5	83.	84.5	87.	90.	93.	

Classes	63-67	68-72	73-77	78-82	83-87	88-92	93-97
	65	70	75	80	85	90	95
Frequency	1	0	16	41	56	37	17

98-102	103-107.
100	105
5	1


GLOUCESTER
♀
NUCLEAR ANGLE
Mode : 85.0°
M : 85.37°
σ : 6.42°
50
40
30
20
10
0
65
70
75
80
85
90
95
100
105

B

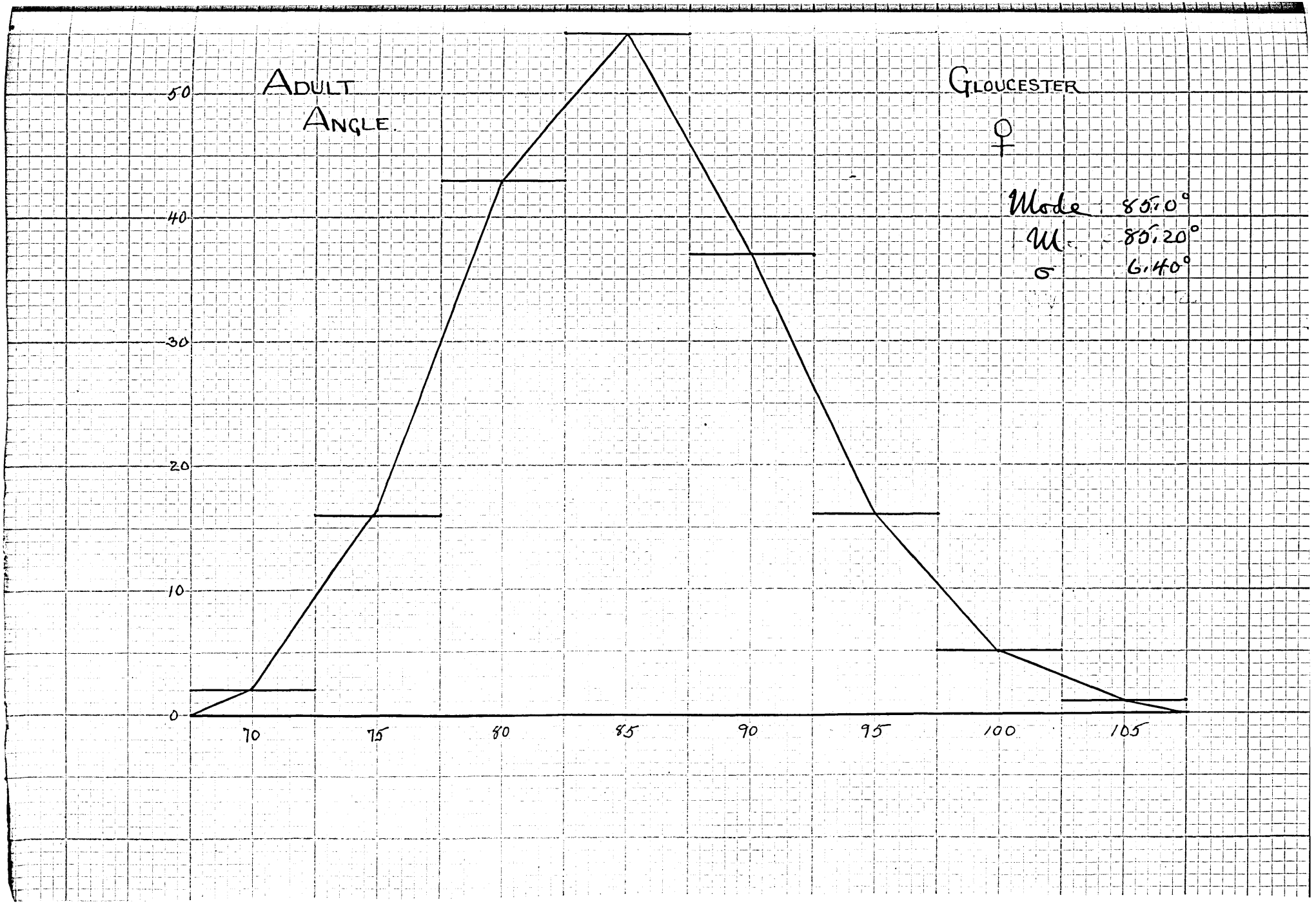
Locality, Gloucester. Females. Seriation of Data

Adult Angle.

1	68.	78.	80.	82.5	85.	87.	89.5	93.
2	68.5	78.	80.	82.5	85.	87.	90.	93.
3	73.	78.	80.	82.5	85.	87.	90.	93.
4	73.	78.5	80.5	83.	85.	87.	90.	93.
5	73.5	78.5	80.5	83.	85.	87.	90.	93.5
6	75.	78.5	80.5	83.	85.	87.	90.	93.5
7	75.	78.5	81.	83.	85.5	87.5	90.	93.5
8	75.	79.	81.	83.	85.5	87.5	90.	94.
9	75.	79.	81.	83.	86.	87.5	90.	95.
10	75.	79.	81.	83.5	86.	87.5	90.5	95.
11	75.5	80.	81.	83.5	86.	87.5	91.	95.5
12	75.5	80.	81.5	83.5	86.	87.5	91.	96.
13	76.	80.	81.5	84.	86.	88.	91.	96.
14	76.5	80.	81.5	84.	86.	88.	91.	96.
15	76.5	80.	81.5	84.	86.5	88.	91.	96.5
16	76.5	80.	82.	84.	86.5	88.	91.5	97.5
17	76.5	80.	82.	84.	86.5	88.5	92.	97.5
18	77.	80.	82.5	84.	86.5	88.5	92.	98.
19	77.5	80.	82.5	84.	86.5	89.	92.	99.
20	77.5	80.	82.5	84.5	86.5	89.	92.	99.
21	77.5	80.	82.5	84.5	87.	89.	92.	103.
22	78.	80.	82.5	85.	87.	89.	92.5	

Classes	68-72	73-77	78-82	83-87	88-92	93-97	98-102
	70	75	80	85	90	95	100
Frequency	2	16	43	55	37	16	5

103-107
105


ADULT
ANGLE.
GLOUCESTER
♀
Mode : 85.0°
μ : 85.20°
σ : 6.40°
50
40
30
20
10
0
70
75
80
85
90
95
100
105

Locality. Gloucester, Females.

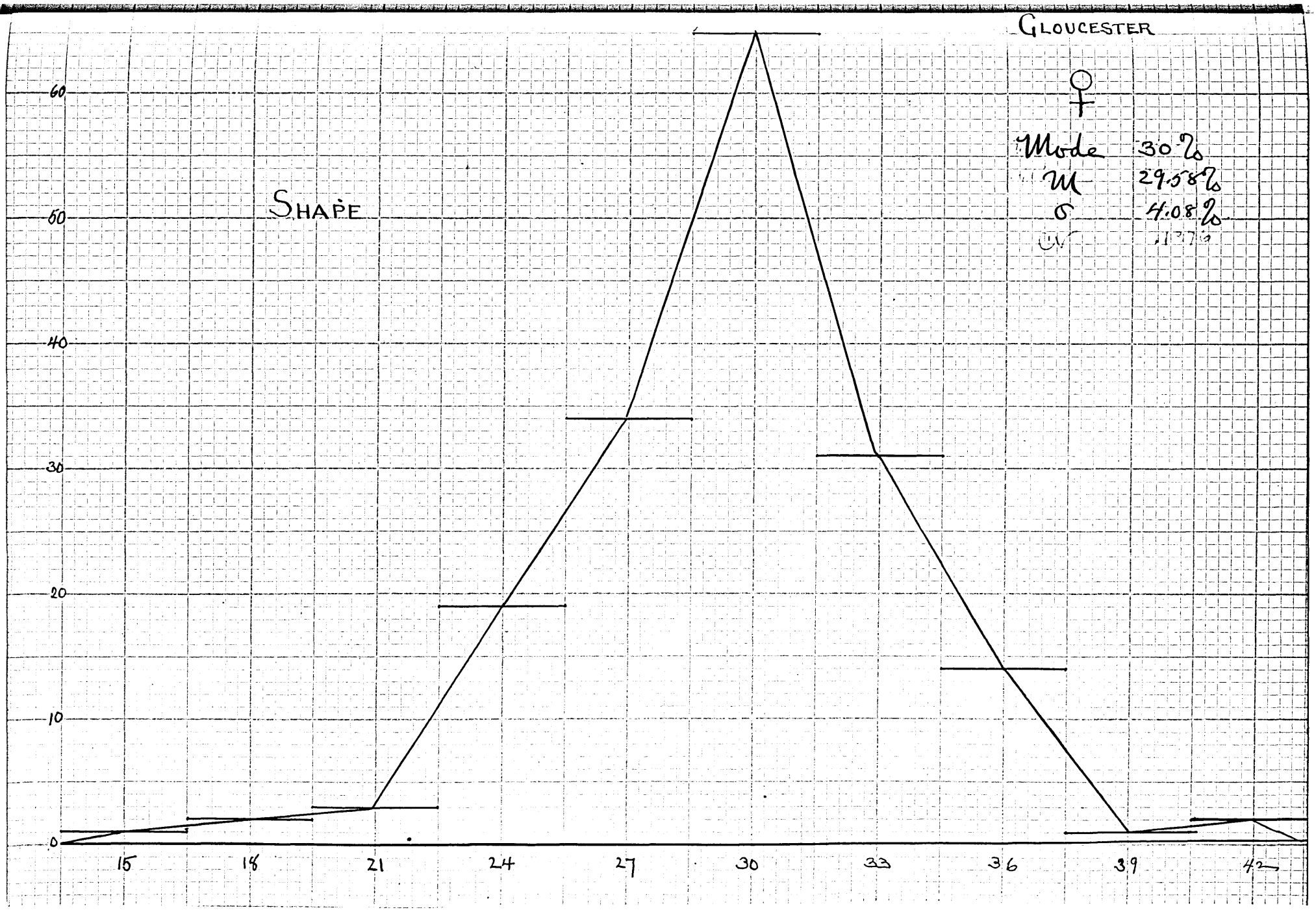
Seriation of Data.

Shape

1	16.1	25.	27.3	28.7	30.	30.7	31.7	33.3
2	16.7	25.	27.8	28.7	30.	30.7	31.9	33.3
3	18.2	25.	27.8	28.7	30.	30.8	31.9	33.3
4	20.	25.	27.8	29.3	30.	30.8	31.9	34.8
5	20.8	26.2	27.8	29.3	30.	31.2	31.9	35.
6	21.5	26.3	27.8	29.5	30.	31.2	31.9	35.
7	21.5	26.3	27.8	29.5	30.	31.2	31.9	35.
8	23.2	26.3	27.8	29.5	30.	31.2	31.9	35.
9	23.2	26.3	27.8	29.5	30.	31.3	31.9	35.3
10	23.2	26.3	27.8	29.5	30.	31.3	31.9	35.7
11	23.7	26.3	27.8	29.5	30.	31.3	31.9	35.8
12	23.8	26.3	27.8	29.5	30.	31.3	32.2	36.1
13	23.8	26.3	27.8	29.5	30.	31.3	32.5	36.1
14	23.8	26.6	27.9	29.5	30.	31.3	33.3	36.2
15	24.1	26.7	28.	29.5	30.3	31.3	33.3	36.3
16	24.2	26.7	28.2	29.5	30.3	31.7	33.3	36.3
17	24.3	26.7	28.7	29.5	30.5	31.7	33.3	36.3
18	24.4	26.8	28.7	29.5	30.5	31.7	33.3	37.6
19	25.	27.	28.7	29.5	30.5	31.7	33.3	37.6
20	25.	27.3	28.7	29.5	30.5	31.7	33.3	38.1
21	25.	27.3	28.7	29.5	30.5	31.7	33.3	42.8
22	25.	27.3	28.7	29.7	30.7	31.7	33.3	42.9

Classes	14-16 (15)	17-19 (18)	20-22 (21)	23-25 (24)	26-28 (27)	29-31 (30)	32-34 (33)	35-37 (36)
Frequency	1	2	3	19	34	65	31	14

38-40 (39)	41-43 (42)
1	2

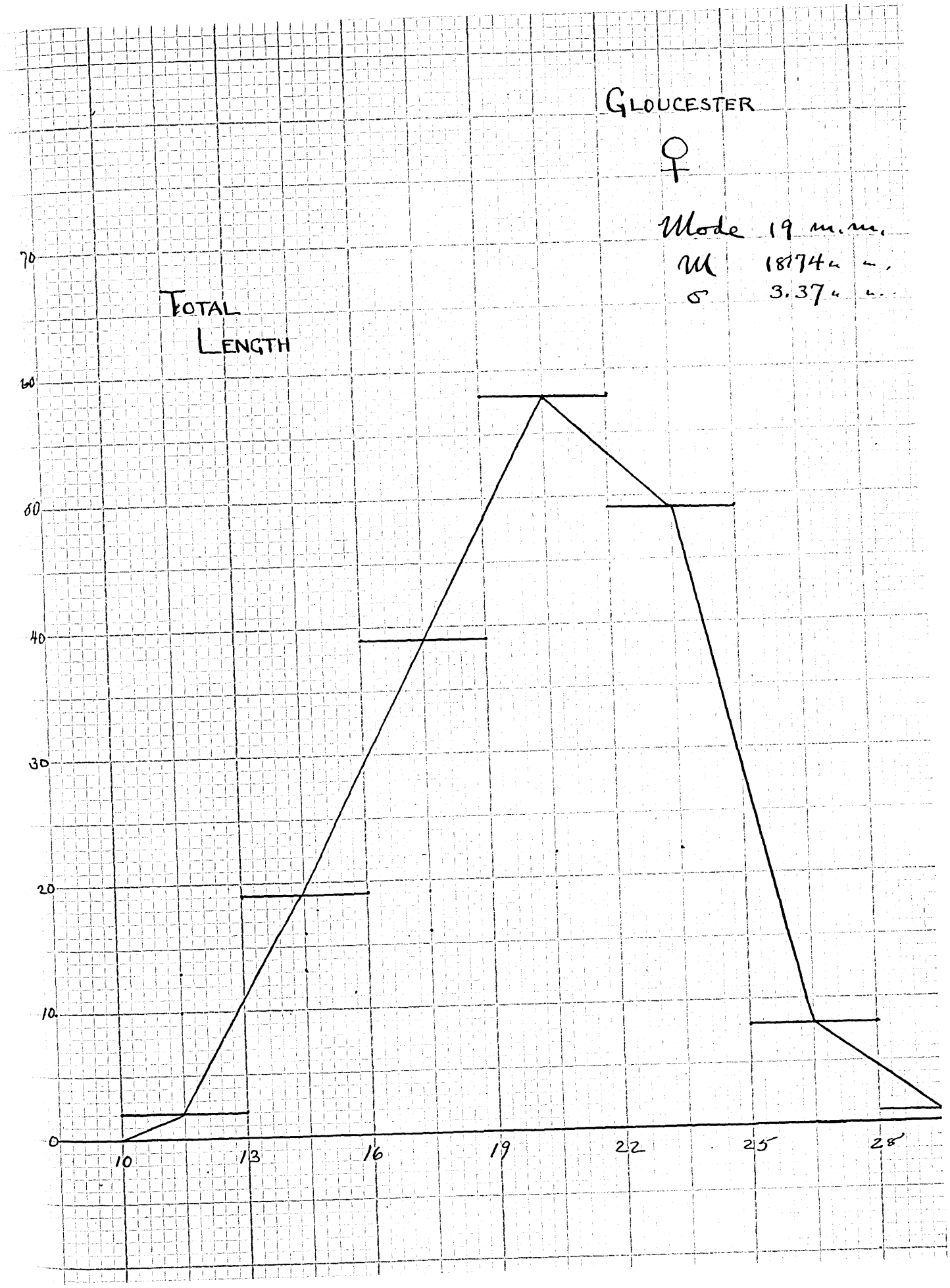

GLOUCESTER
♀
Mode 30%
M 29.58%
σ 4.08%
SHAPE
60
50
40
30
20
10
0
15
18
21
24
27
30
33
36
39
42

Locality. Gloucester. Female. Seriation of Data

Total length.

1	11.	15.	17.	18.	19.	20.	21.	22.
2	11.	15.	17.	18.	19.	20.	21,	22,
3	12.	15.	17.	18.	19.	20.	21,	22.
4	12.5	15.	17.	18.	19.	20.	21,	22.5
5	12.5	16.	17.	18.	19.	20.	21,	22.5
6	13.	16.	17.	18.	19.	20.	21.	22.5
7	13.	16.	17.	18.	19.	20.	21.5	22.5
8	13.	16.	17.	18.	19.	20.	21.5	22.5
9	13.	16.	17.	18.	20.	20.5	21.5	23.
10	13.	16.	17.	18.	20.	20.5	22.	23.
11	13.	16.	17.	18.	20.	20.5	22.	23.
12	13.5	16.	17.	18.	20.	21.	22.	23.
13	14.	16.	17.	18.	20.	21.	22.	23.
14	14.	16.	17.	18.5	20.	21.	22.	24.
15	14.	16.5	17.	19.	20.	21.	22.	24.
16	14.	16.5	17.	19.	20.	21.	22.	24.
17	14.	16.5	18.	19.	20.	21.	22.	24.
18	14.	16.5	18.	19.	20.	21.	22.	25.
19	14.	16.5	18.	19.	20.	21.	22.	25.
20	14.	17.	18.	19.	20.	21.	22.	25.
21	14.	17.	18.	19.	20.	21.	22.	25.
22	15.	17.	18.	19.	20.	21.	22.	28.

Classes	9-11	12-14	15-17	18-20	21-23	24-26	27-29
	10	13	16	19	22	25	28
Frequency	2	19	39	58	49	8	1


GLOUCESTER
♀
Mode 19 m.m.
M 18.74 m.m.
σ 3.37 m.m.
TOTAL LENGTH
70
60
50
40
30
20
10
0
10
13
16
19
22
25
28

F.

Locality. Gloucester. Females.

Seriation of Data.

Characters.

Imbrications

Classes	0	1	2	Total
Frequency	175	1	0	176

Teeth

Classes	0	1	2
Frequency	148	25	3

Columella

Classes	0	1	2	3
Frequency	75	80	21	0

Sutures

Classes	0	1	2
Frequency	140	35	1

Ribs

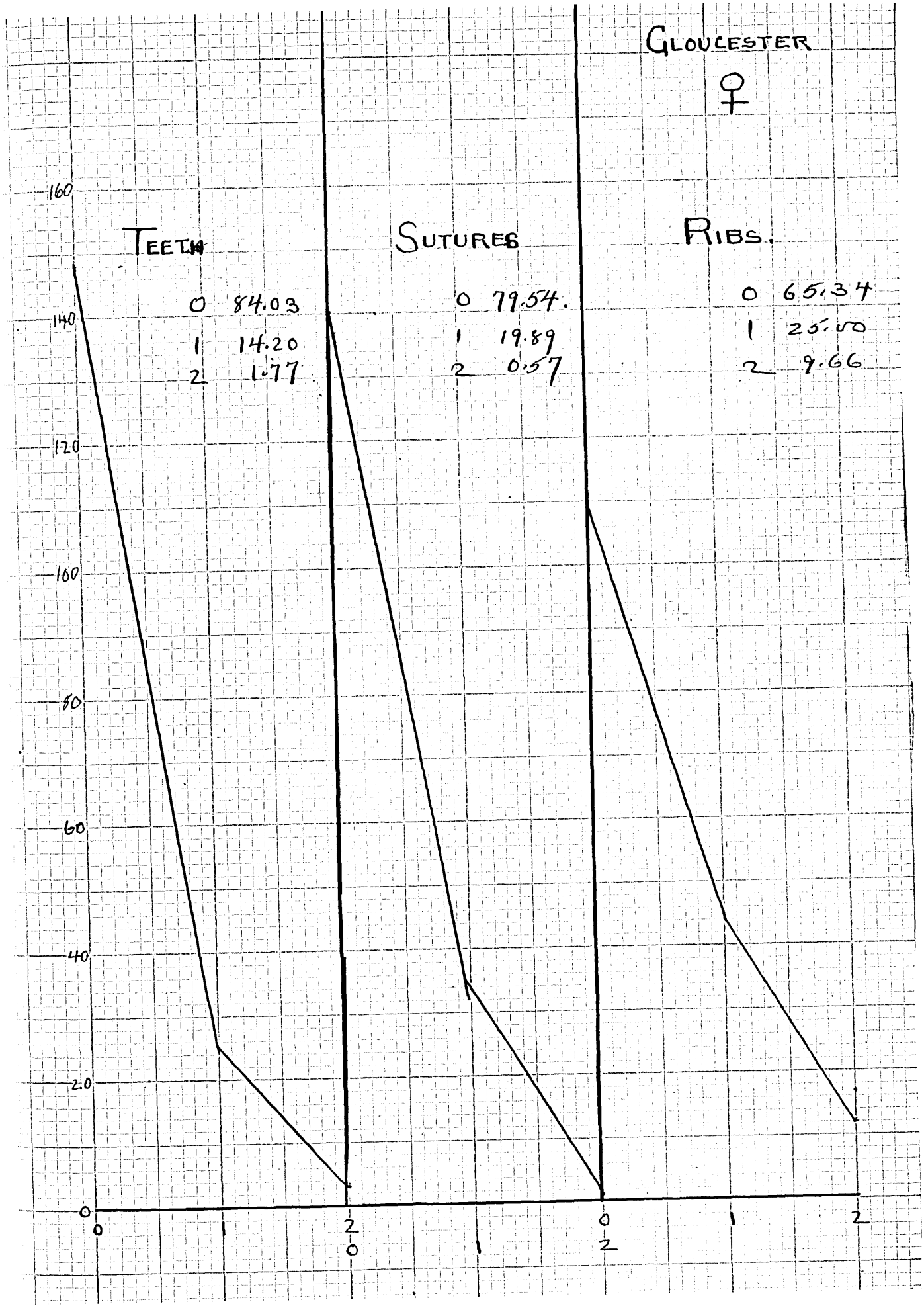
Classes	0	1	2
Frequency	115	44	17

GLOUCESTER

♀

0	42.61 %
1	45.45 %
2	11.94 %
3	0 %

COLUMELLA.


GLOUCESTER
♀
160
140
120
100
80
60
40
20
0
TEETH
0 84.03
1 14.20
2 1.77
SUTURES
0 79.54.
1 19.89
2 0.57
RIBS.
0 65.34
1 25.00
2 9.66
0
1
2
0
1
2
0
1
2

COLLECTION NO. 8.

MALE SHELLS FROM NEWPORT.

101 SPECIMENS.

NEWPORT. Males.

Collection made Saturday, April 14, at 12:30 P. M. at Brenton's Cove and at Price's Cove.

Brenton's Cove is a sheltered spot, Purpura scarce.

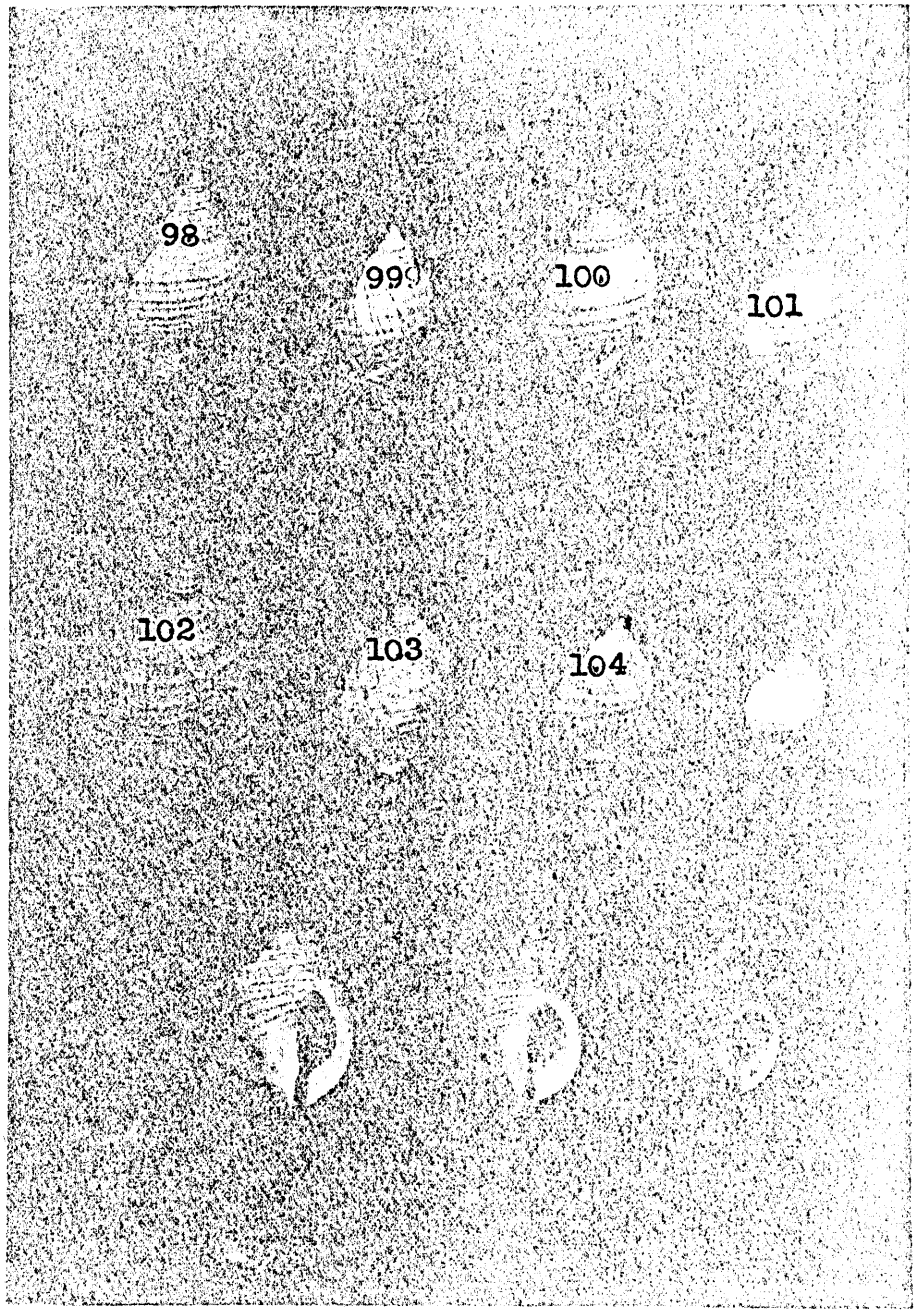
Price's Cove opens to the sea and receives good wave action. Purpura more abundant than at Brenton's Cove, but not so abundant as at Eastport, Kennebunk Beach or Gloucester. The character of the coast is similar to that at Gloucester except that there are no large boulders. Rock-weed is abundant.

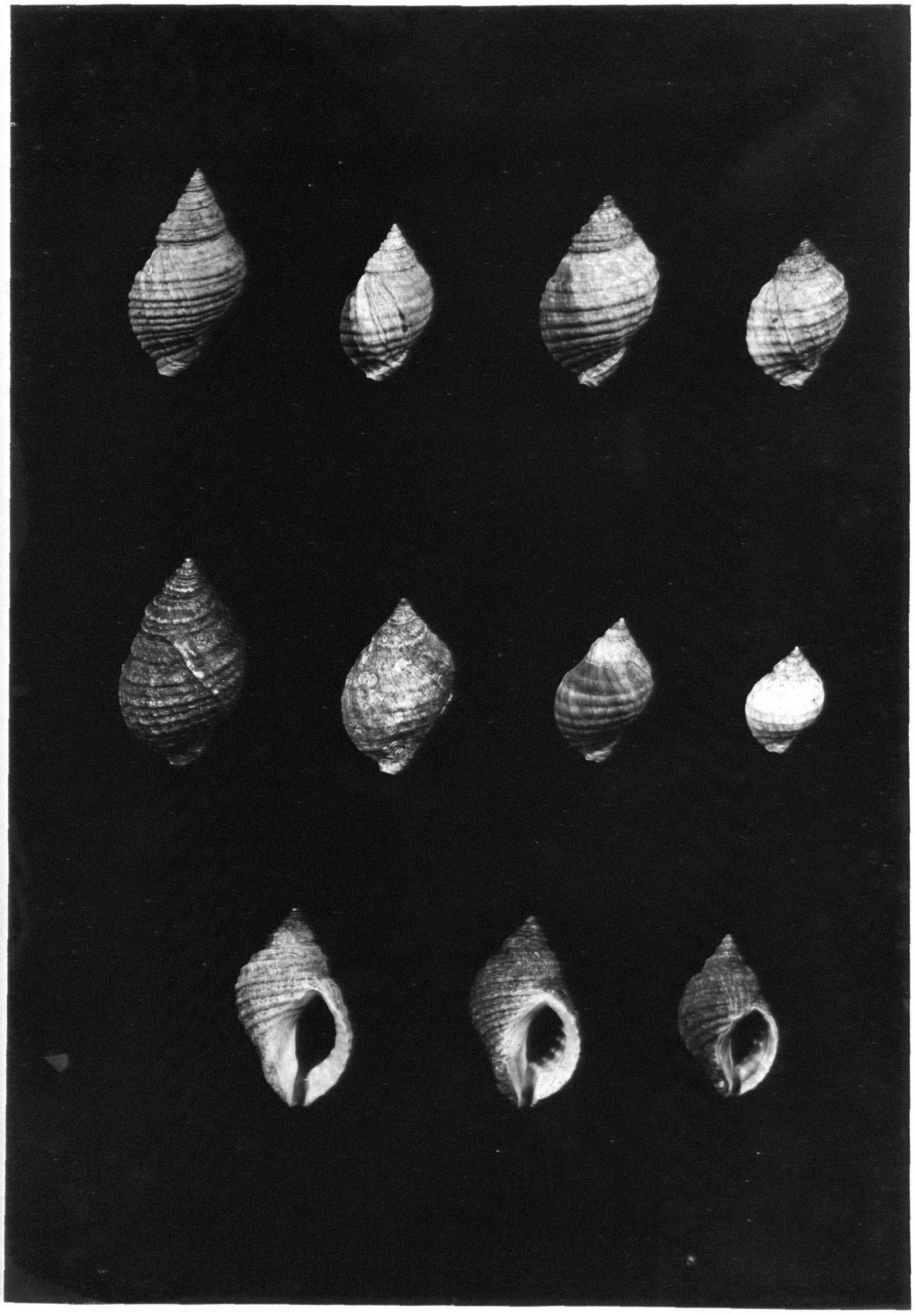
The two lots were mixed together and measured. It is not to this fact, but to the fact that few numbers were obtained that I attribute failure to get normal frequency curves.

A map of the locality is appended.

PLATE XII.

NEWPORT.		Males.
Figs.	98-100	Nuclear Angle.
"	"	Adult "
"	101-104	Total Length.


98
99
100
101
102
103
104



Locality, Newport. Males. Measurements. 1.

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Cclum.	Sutures	Ribs	Weight	No.
θ	72.5	72.5	26.	9.	34.7	9.05	0	1	0	1	1	2.34	1
θ	75.0	75.0	27.	10.	37.2	10.3	0	0	0	1	1	2.78	2
θ	----	75.5	27.	9.	33.3	9.28	1	0	0	1	2	2.50	3
θ	74.0	70.0	25.	9.	36.0	12.3	0	1	1	0	1	3.06	4
θ	71.0	60.0	27.	11.	40.8	8.70	0	1	1	0	2	2.34	5
θ	62.0	62.0	28.	11.	39.3	11.0	0	0	1	0	1	3.07	6
θ	75.5	75.5	25.	9.	36.0	9.85	0	0	0	0	1	2.46	7
θ	70.5	70.5	25.	10.	40.0	9.59	0	1	1	0	0	2.39	8
θ	67.5	67.5	30.	14.	46.7	12.2	0	1	1	0	1	3.64	9
θ	68.0	65.0	28.	10.	35.7	12.0	0	1	1	0	2	3.34	10
θ	72.0	72.0	26.	10.	38.5	10.0	0	1	0	0	2	2.62	11
θ	74.5	74.5	25.	8.	32.0	9.60	0	0	1	0	1	2.39	12
θ	69.0	69.0	25.	11.	44.0	9.80	1	0	2	0	2	2.44	13
θ	----	72.0	24.	10.	41.7	7.78	0	0	1	0	1	1.86	14
θ	72.0	72.0	23.	9.	39.2	9.40	0	2	2	0	1	2.16	15
θ	72.5	68.0	25.	10.	40.0	10.6	0	1	1	0	1	2.64	16
θ	75.0	75.0	24.	8.	33.3	8.98	0	1	1	0	1	2.15	17
θ	72.0	69.0	24.	10.	41.7	8.80	0	0	2	0	1	2.12	18
θ	----	73.0	23.	8.	34.8	10.0	0	0	1	0	1	2.28	19
θ	----	78.0	23.	8.	34.8	8.58	0	0	2	0	1	1.97	20
θ	----	70.0	25.	11.	44.0	10.8	0	2	1	0	1	2.70	21
θ	----	78.0	25.	9.	36.0	10.6	0	1	1	1	1	2.64	22
θ	76.5	76.5	24.	8.	33.3	10.0	0	0	0	0	1	2.39	23
θ	80.5	80.5	23.	9.	39.2	8.90	0	2	1	0	1	2.04	24
θ	70.0	65.0	23.	9.	39.2	7.28	0	0	0	1	0	1.67	25

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	----	76.5	25.	10.	40.0	11.3	0	0	1	0	2	2.81			26
θ	----	69.5	26.	10.	38.5	8.05	0	0	0	0	2	2.09			27
θ	64.0	64.0	26.	9.	34.7	7.90	0	0	1	0	0	2.05			28
θ	70.5	70.5	25.	9.	36.0	8.80	0	1	1	0	1	2.19			29
θ	63.5	63.5	27.	11.	40.8	6.41	0	1	0	1	1	1.73			30
θ	70.0	67.0	25.	10.	40.0	7.50	0	1	1	0	1	1.87			31
θ	----	78.5	23.	8.	34.8	7.85	0	0	0	0	1	1.80			32
θ	----	72.0	23.	8.	34.8	9.50	0	0	1	0	1	2.18			33
θ	64.0	64.0	25.	11.	44.0	6.68	1	0	0	1	2	1.67			34
θ	----	76.0	22.	9.	41.0	9.30	0	1	2	0	1	2.05			35
θ	68.0	64.0	24.	9.	37.5	6.24	0	0	0	1	2	1.50			36
θ	----	68.5	23.	8.	34.8	7.45	0	0	0	0	2	1.71			37
θ	60.5	60.5	28.	12.	42.8	7.53	0	0	1	0	2	2.11			38
θ	64.5	64.5	22.	9.	41.0	7.88	0	1	0	0	0	1.73			39
θ	74.0	74.0	22.	8.	36.4	6.13	0	0	0	0	2	1.35			40
θ	----	69.0	23.	10.	43.5	7.64	0	1	1	0	1	1.75			41
θ	70.0	66.0	25.	11.	44.0	10.4	0	1	1	0	1	2.60			42
θ	69.0	69.0	25.	10.	40.0	12.0	0	1	2	1	0	2.98			43
θ	----	73.0	23.	9.	39.2	7.80	0	0	0	0	1	1.79			44
θ	----	75.0	21.	7.	33.3	7.05	0	1	0	0	1	1.48			45
θ	67.0	67.0	25.	11.	44.0	8.70	0	0	2	0	2	2.17			46
θ	76.0	72.0	22.	8.	36.4	8.10	0	1	1	0	1	1.78			47
θ	----	74.0	21.	7.	33.3	7.45	0	0	2	0	1	1.56			48
θ	----	69.0	21.	7.	33.3	7.45	0	0	0	0	1	1.56			49
θ	----	73.5	22.	9.	41.0	8.94	0	1	1	0	2	1.96			50

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight	No.
θ	73.5	73.5	25.	10.	40.0	9.40	0	1	1	0	1	2.35	51
θ	76.0	76.0	23.	8.	34.8	9.10	0	1	0	0	1	2.09	52
θ	----	79.0	21.	7.	33.3	7.50	0	0	0	0	1	1.57	53
θ	70.0	64.0	25.	10.	40.0	7.20	0	0	1	0	2	1.80	54
θ	----	64.0	25.	10.	40.0	7.20	0	2	1	1	2	1.98	55
θ	----	75.0	23.	8.	34.8	6.75	0	0	1	0	2	1.55	56
θ	----	72.0	22.	8.	36.4	8.35	0	0	1	0	0	1.83	57
θ	----	75.0	22.	9.	41.0	8.60	0	0	2	0	1	1.88	58
θ	65.5	65.5	24.	9.	37.6	9.35	0	1	1	0	2	2.24	59
θ	71.0	67.0	22.	8.	36.4	9.00	0	1	1	0	0	1.98	60
θ	----	76.5	21.5	9.	41.9	8.50	0	2	1	0	1	1.82	61
θ	70.0	67.0	21.	7.	33.3	4.43	1	0	0	0	2	0.93	62
θ	----	72.5	23.	10.	43.5	7.90	0	0	1	0	0	1.81	63
θ	----	65.5	21.	8.	38.2	6.95	0	0	0	0	1	1.46	64
θ	----	74.5	25.	9.	36.0	6.80	0	0	0	0	2	1.70	65
θ	----	71.0	21.	9.	42.8	5.38	0	0	2	0	0	1.13	66
θ	----	71.0	22.	8.	36.4	6.78	0	1	1	0	1	1.51	67
θ	----	75.0	21.	7.	33.3	6.48	0	0	0	0	1	1.36	68
θ	74.0	65.5	21.	7.	33.3	7.40	0	1	0	0	1	1.55	69
θ	74.5	67.5	21.	8.	38.2	7.40	0	0	1	0	1	1.55	70
θ	75.5	75.5	20.	8.	40.0	6.65	0	0	0	0	1	1.33	71
θ	----	70.0	20.	8.	40.0	7.40	0	0	2	0	0	1.48	72
θ	72.0	72.0	21.	8.	38.2	6.45	0	0	1	0	1	1.35	73
θ	67.5	67.5	21.	8.	38.2	7.15	0	1	1	0	1	1.50	74
θ	71.0	71.0	22.	9.	41.0	7.60	0	0	1	0	1	1.67	75

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
θ	73.0	73.0	21.	9.	42.8	7.15	0	0	1	0	1	1.50			76
θ	83.0	83.0	20.	8.	40.0	7.50	0	1	1	0	1	1.50			77
θ	----	68.0	23.	9.	39.2	5.70	0	0	0	1	1	1.31			78
θ	66.5	66.5	21.	9.	42.8	6.65	0	1	0	1	1	1.40			79
θ	----	76.5	21.	8.	38.2	7.35	0	0	1	0	1	1.54			80
θ	76.0	76.0	21.	8.	38.2	7.15	0	0	1	0	1	1.50			81
θ	70.0	70.0	22.	8.	36.4	8.20	0	0	0	0	1	1.80			82
θ	73.0	73.0	22.	9.	41.0	7.30	0	0	0	0	1	1.60			83
θ	----	72.0	22.	8.	36.4	7.70	0	1	2	0	1	1.69			84
θ	----	77.5	19.	6.	31.7	5.75	0	0	1	0	1	1.09			85
θ	68.0	68.0	21.	8.	38.2	6.42	0	0	1	0	1	1.35			86
θ	----	73.0	21.	8.	38.2	7.15	0	1	1	0	1	1.50			87
θ	69.0	66.0	22.	8.	36.4	6.60	0	0	0	0	2	1.45			88
θ	76.0	76.0	20.	8.	40.0	6.85	0	1	1	0	1	1.37			89
θ	67.0	67.0	20.	7.	35.0	6.65	0	0	1	0	1	1.33			90
θ	67.5	67.5	20.	9.	45.0	7.50	0	0	2	0	2	1.50			91
θ	63.0	63.0	21.	8.	38.2	5.15	0	1	0	1	1	1.08			92
θ	----	73.0	19.	8.	42.2	6.58	0	0	0	0	1	1.25			93
θ	----	70.5	20.	8.	40.0	6.25	0	0	1	0	1	1.25			94
θ	----	70.0	19.	8.	42.2	7.18	0	1	1	0	2	1.36			95
θ	81.5	81.5	20.	7.	35.0	6.25	0	0	2	0	0	1.25			96
θ	----	77.0	20.	6.	30.0	6.05	0	0	0	0	0	1.21			97
θ	79.0	79.0	18.	6.	33.3	5.90	0	0	1	0	1	1.00			98
θ	70.5	70.5	18.	7.	38.8	5.90	0	0	1	0	0	1.00			99
θ	----	69.0	18.	7.	38.8	5.90	0	0	1	0	1	1.00			100
θ	----	75.0	15.	5.	33.3	4.27	0	0	1	0	0	0.64			101

COLLECTION NO. 9.

FEMALE SHELLS FROM NEWPORT.

94 SPECIMENS.

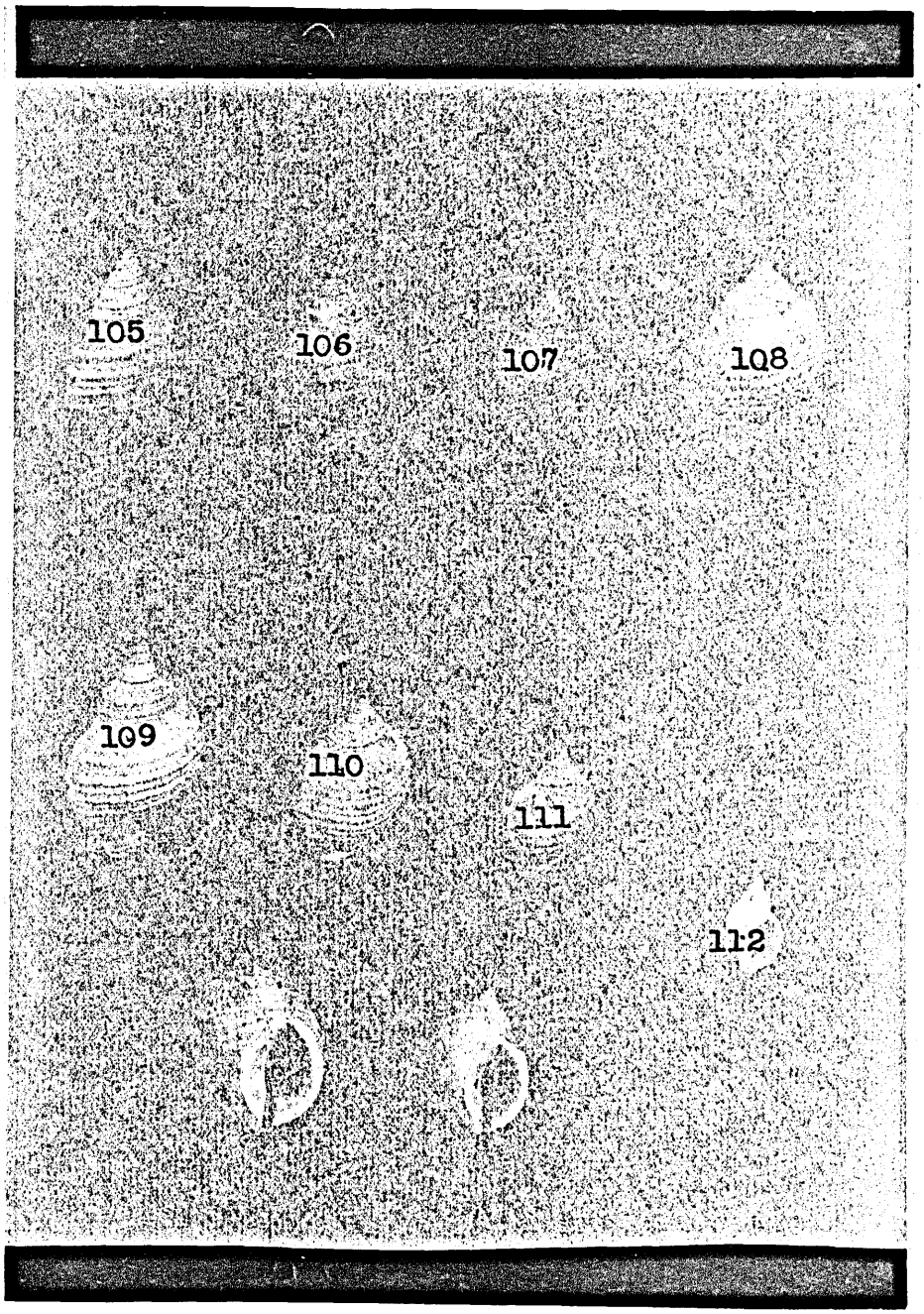
PLATE XIII.

NEWPORT. Females.

Figs. 105-108 Nuclear Angle.

" " Adult "

" 106-109 Total Length.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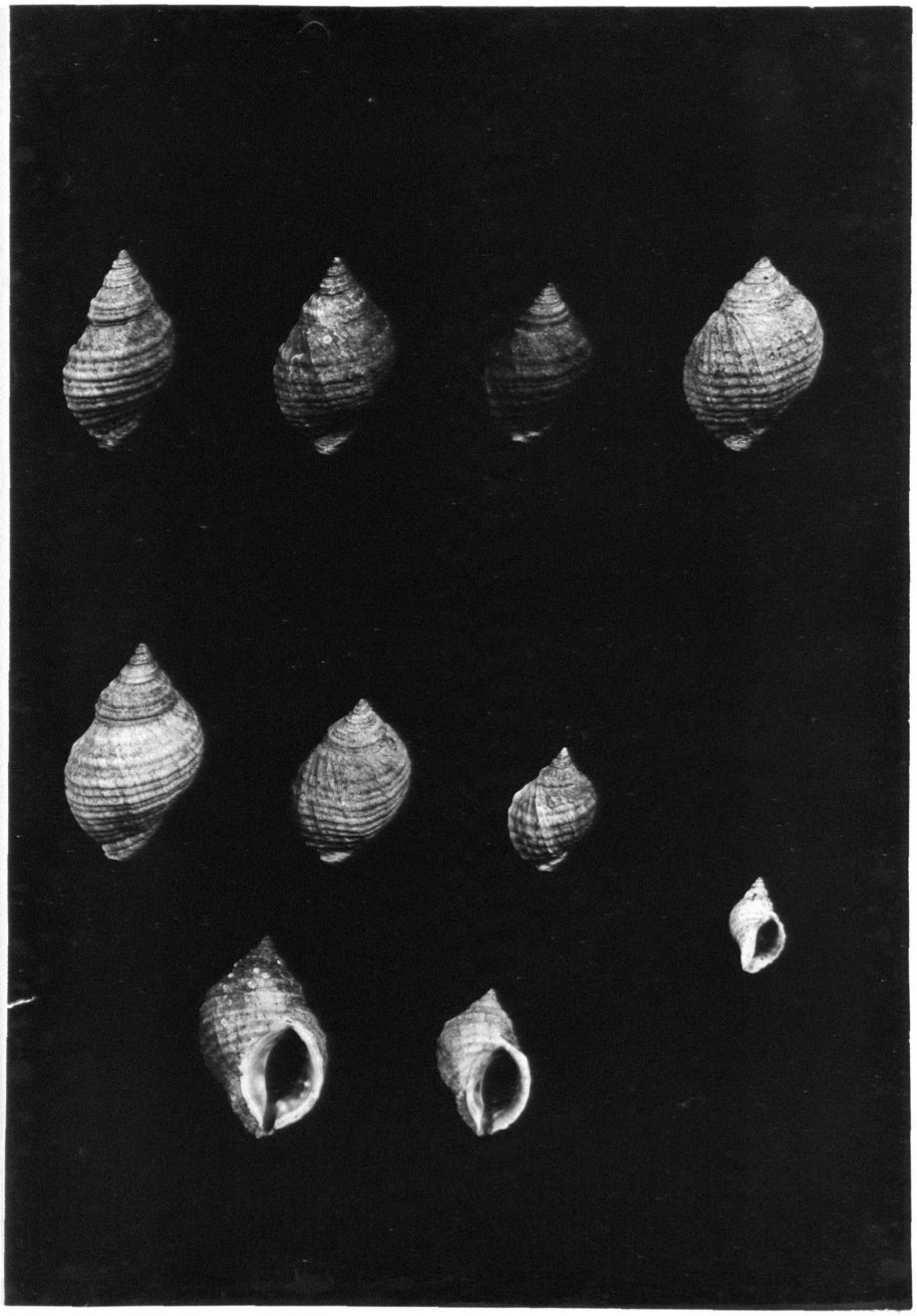

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight	No.
♀	70.0	70.0	30.	11.	36.7	13.2	0	0	1	0	1	3.95	1
♀	81.5	81.5	26.	10.	38.5	13.9	0	1	1	0	2	3.60	2
♀	78.5	78.5	27.	10.	37.2	13.4	0	0	2	0	2	3.60	3
♀	70.0	70.0	29.	10.	34.5	11.0	0	0	1	0	1	3.18	4
♀	65.5	65.5	30.	12.	40.0	8.90	0	0	1	1	1	2.67	5
♀	65.0	65.0	28.	12.	42.8	10.4	0	0	0	0	1	2.91	6
♀	----	76.0	27.	12.	44.3	14.2	0	0	2	0	1	3.83	7
♀	72.0	64.0	26.	10.	38.5	11.2	1	1	2	0	1	2.92	8
♀	----	76.5	25.	10.	40.0	12.9	0	0	1	0	1	3.23	9
♀	81.0	81.0	23.	8.	43.5	11.6	1	0	2	0	1	2.67	10
♀	----	71.5	25.	9.	36.0	6.85	1	0	0	0	2	1.71	11
♀	----	72.5	28.	10.	35.7	10.0	0	0	0	0	1	2.82	12
♀	69.0	69.0	27.	11.	40.8	10.6	1	0	1	0	2	2.85	13
♀	77.0	72.5	25.	9.	36.0	10.7	0	0	1	0	0	2.67	14
♀	76.0	76.0	25.	9.	36.0	8.80	0	0	1	0	1	2.20	15
♀	----	67.5	25.	10.	40.0	9.15	0	0	0	0	2	2.28	16
♀	----	68.5	26.	10.	38.5	10.9	0	0	0	0	0	2.84	17
♀	----	80.0	25.	9.	36.0	10.4	0	0	1	0	1	2.60	18
♀	68.0	64.0	25.	11.	44.0	10.6	0	0	2	0	1	2.64	19
♀	----	70.5	29.	11.	37.9	11.6	0	0	1	0	1	3.34	20
♀	76.5	76.5	24.	9.	37.5	10.8	0	0	0	0	1	2.58	21
♀	71.5	71.5	22.5	9.	40.0	7.70	0	0	0	1	0	1.73	22
♀	70.0	70.0	28.	12.	42.8	11.1	1	0	1	0	2	3.15	23
♀	66.0	66.0	25.	11.	44.0	10.1	0	0	1	0	0	2.53	24
♀	----	72.0	25.	10.	40.0	11.2	0	1	0	0	1	2.80	25

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	65.0	65.0	25.	11.	44.0	8.45	0	1	0	0	1	2.12			26
♀	67.5	67.5	27.	12.	44.3	10.6	0	0	1	0	1	2.85			27
♀	----	66.5	24.	11.	45.9	7.45	0	0	0	0	1	1.79			28
♀	73.0	73.0	23.	9.	39.2	8.60	0	0	0	0	0	1.97			29
♀	73.5	73.5	23.	9.	39.2	8.00	0	0	0	0	1	1.83			30
♀	75.0	75.0	24.	10.	41.7	9.20	0	1	1	0	1	2.22			31
♀	61.0	61.0	27.	12.	44.3	8.55	0	0	0	0	1	2.32			32
♀	72.5	72.5	24.	9.	37.5	10.1	0	0	1	0	0	2.43			33
♀	70.0	70.0	24.	11.	45.9	9.20	0	0	1	0	0	2.22			34
♀	65.5	65.5	25.	10.	40.0	9.15	0	0	0	0	1	2.28			35
♀	75.5	67.5	25.	10.	40.0	10.0	0	0	1	0	1	2.50			36
♀	62.0	58.5	27.	11.	40.8	9.40	0	0	1	1	1	2.53			37
♀	73.5	73.5	23.	9.	39.2	7.80	0	0	1	1	2	1.79			38
♀	----	67.0	23.	8.	34.8	7.85	0	0	1	0	0	1.81			39
♀	----	69.0	24.	10.	41.7	6.15	0	0	1	1	2	1.48			40
♀	71.5	71.5	24.	10.	41.7	10.1	0	0	1	0	1	2.43			41
♀	76.0	76.0	23.	8.	34.8	9.35	0	2	1	0	0	2.15			42
♀	67.5	65.7	24.	9.	37.5	7.92	0	0	0	0	1	1.90			43
♀	70.0	70.0	24.	10.	41.7	7.50	0	0	0	0	0	1.80			44
♀	73.5	73.5	22.	7.	31.8	8.78	0	0	1	0	0	1.93			45
♀	----	72.5	23.	7.	30.5	6.75	0	0	1	0	1	1.57			46
♀	----	76.5	23.	8.	34.8	8.63	0	0	0	0	1	1.98			47
♀	----	77.5	23.	9.	39.2	8.63	0	2	1	0	1	1.98			48
♀	----	66.5	26.	11.	42.3	8.85	0	0	1	0	0	2.30			49
♀	79.0	75.5	22.	8.	36.4	9.50	1	0	1	1	1	2.09			50

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	70.0	70.0	24.	8.	33.3	8.10	0	0	1	1	1	1.94			51
♀	75.5	75.5	26.	10.	38.5	11.4	0	1	2	1	1	2.94			52
♀	71.5	71.5	24.	9.	37.5	7.70	0	0	2	0	1	1.85			53
♀	77.0	77.0	24.	8.	33.3	9.40	0	0	1	0	1	2.26			54
♀	72.5	72.5	23.	8.	34.8	7.33	0	0	1	0	1	1.68			55
♀	70.0	70.0	23.	8.	34.8	8.30	0	0	2	0	1	1.91			56
♀	69.0	69.0	23.	9.	39.2	7.14	0	0	0	0	1	1.64			57
♀	----	68.5	22.5	9.	40.0	7.21	0	0	1	0	1	1.62			58
♀	76.0	76.0	22.	8.	36.4	8.80	0	0	0	0	1	1.93			59
♀	----	68.5	23.	8.	34.8	6.62	1	0	1	1	2	1.52			60
♀	----	77.5	23.	8.	34.8	9.40	0	1	1	0	1	2.16			61
♀	----	67.5	26.	10.	38.5	6.83	0	0	0	1	2	1.77			62
♀	67.0	67.0	22.5	9.	40.0	6.75	0	0	2	0	1	1.52			63
♀	72.5	72.5	21.	7.	33.3	6.20	0	0	1	1	1	1.30			64
♀	----	83.5	21.	8.	38.2	9.40	0	1	2	0	1	1.97			65
♀	----	74.0	22.	8.	36.4	7.41	1	0	0	0	1	1.63			66
♀	77.5	77.5	21.	7.	33.3	7.15	0	1	2	0	1	1.50			67
♀	----	75.5	21.	8.	38.2	7.63	0	0	0	0	1	1.60			68
♀	----	73.5	21.	8.	38.2	6.81	0	1	2	0	1	1.43			69
♀	75.0	75.0	21.	7.	33.3	6.95	0	0	1	0	1	1.46			70
♀	----	66.0	22.	8.	36.4	7.92	0	1	0	1	1	1.74			71
♀	70.0	70.0	23.	8.	34.8	7.60	0	0	1	0	1	1.75			72
♀	75.0	75.0	22.	8.	36.4	7.38	0	0	1	0	1	1.62			73
♀	----	71.0	21.	8.	38.2	7.44	1	0	1	0	1	1.56			74
♀	----	74.5	22.	8.	36.4	8.88	0	0	1	1	1	1.95			75

Sex	Nuclear Angle	Adult Angle	Total Length	Partial Length	Shape	Thick-ness	Imb.	Teeth	Colum.	Sutures	Ribs	Weight			No.
♀	73.0	73.0	21.	7.	33.3	6.38	0	0	0	0	1	1.34			76
♀	79.0	79.0	20.	8.	40.0	7.30	0	0	0	0	2	1.46			77
♀	----	73.5	21.	8.	38.2	6.48	0	0	1	0	1	1.36			78
♀	----	78.0	20.	7.	35.0	5.75	1	0	2	0	2	1.15			79
♀	75.5	75.5	21.	7.	33.3	5.15	1	0	0	1	2	1.08			80
♀	78.5	78.5	20.	6.	30.0	6.62	0	0	0	1	2	1.32			81
♀	78.5	78.5	21.	8.	38.2	8.78	0	0	1	0	1	1.84			82
♀	----	74.0	20.	7.	35.0	6.10	0	1	0	1	1	1.22			83
♀	----	75.0	18.	5.	27.8	3.78	0	0	2	0	1	0.68			84
♀	----	80.0	16.5	6.	36.3	4.97	0	0	0	1	1	0.82			85
♀	----	75.0	16.	6.	37.5	3.13	2	0	0	1	2	0.50			86
♀	78.5	78.5	15.	5.	33.3	2.00	0	0	0	1	2	0.30			87
♀	66.5	66.5	15.	6.	40.0	2.34	1	0	0	1	2	0.35			88
♀	67.0	67.0	15.	5.	33.3	1.87	0	0	1	0	0	0.28			89
♀	70.0	70.0	14.	6.	43.0	1.57	1	0	0	0	2	0.22			90
♀	68.5	68.5	13.	5.	38.5	1.70	0	0	0	1	1	0.22			91
♀	72.0	72.0	13.	5.	38.5	1.30	0	0	0	1	1	0.17			92
♀	73.0	73.0	13.	4.	30.8	1.93	1	0	0	0	2	0.25			93
♀	65.0	65.0	13.	5.	38.5	1.93	0	0	0	1	1	0.25			94

CONCLUSIONS.

I will now review the foregoing data as concisely as possible, calling attention to some of the facts brought out by them.

In looking over the curves, the fact which first strikes one is the remarkable way in which they all approach curves of normal frequency. There are no multimodal curves, nor any particularly asymmetrical or skew curves among them all. The following table indicates the close aggrement of the modes with the means in the different characters and localities:

E. stands for Eastport, G. for Gloucester, f. for female, and m. for male.

	E.I.m.	E.I.f.	E.II.m.	E.II.f.	G. m.	G. f.	
Mode	73.0	75.3	75.5	76.5	84.0	85.	Nuclear
Mean	73.26	75.25	75.18	76.51	84.16	85.37	Angle
Mode	73.0	73.0	73.0	73.4	84.0	85.0	Adult
Mean	71.75	72.77	72.93	74.21	83.86	85.20	Angle
Mode	40.0	39.0	37.7	35.9	32.0	30.0	Shape
Mean	39.16	38.93	37.81	35.97	31.73	29.58	Ratio
Mode	28.0	30.0	25.0	26.0	18.5	19.0	Total
Mean	28.15	29.65	24.57	25.49	18.50	18.74	Length

The arrangement of the characters into curves of normal frequency shows stability of form, and that for a certain character in a certain spot, a definite and permanent mean value of the character is to be found. As a result of this, slight differences in general averages of the same character from two lo-

calities can be trusted quite as much as large differences. From these facts, we may state that the species is stable in each locality, i. e., it varies about fixed or nearly fixed points.

THE CONSTANTS OF THE CURVES,-- THEIR VALUE. Since the mode and mean are so nearly coincident in this species, the employment of one rather than the other is of no consequence theoretically. As a matter of fact, however, the mean has been calculated with more accuracy, being carried to two decimal places, and is thus a more delicate differential between groups slightly separated. Where such accuracy is not needed, the mode will be found more convenient because of the fewer figures required to express it. The standard deviation is useful, of course, in determining the amount of variability in each character. The variability of a character can be compared by this constant with the same character wherever found, or with any other character expressed in the same units. It is not applicable in comparing characters which are expressed in different units. Thus, we can compare the variability of the nuclear angle from two localities or the nuclear angle of one locality and the adult angle of another by means of the standard deviation, but none of these characters can be compared with the shape ratio which is expressed in percentages, or the total length (expressed in millimeters). A constant has been suggested (Pearson '95) called the "coefficient of variation" and denoted by the symbol C. V. which may be used to measure variability independently of the unit measured. The constant is derived by dividing the standard

deviation by the mean, a process indicated in the formula

$$C.\ V. = \frac{\sigma}{M} \times 100.$$

The constant is recommended by several workers as being a valuable index of variability, but its use has been neglected in this work.

The justification for the constant is found (Davenport '97), in the following considerations: "The relative size of the average deviation of two organs depends very largely on the relative size of the two organs. Where the mean dimension is large, we expect a greater deviation than where it is small. Thus, the average deviation of the stature of adult British males is about two in. An average deviation of two inches in the length of nose in any race would clearly indicate a much greater variability in the nose-length than in the stature. In comparing the variability of two such diverse measures as stature and nose-length, it is better to compare the ratios of the average deviations to the mean dimension. Thus, since the mean stature of adult British males may be taken at 67 in., variability in stature may be expressed by the ratio $\frac{2}{67} = .02985$. This number indicates that the standard deviation from the mean stature is about .03 of the mean stature; which is clearly more important than to say that it is two inches. Moreover, the mode of expression has the advantage that it is independent of the unit in which the dimension is measured, whether feet, millimeters, grams, degrees or ergs."

This view is objected to by Duncker ('99) who maintains that the view that we expect high indices of variability where

the mean is high is untenable. As evidence for this conclusion he points to the fact that in the four numerical examples given in his paper the index of variability is inversely proportional to the mean. The following case taken from my own work further shows the view to be untenable:

Adult Angle	σ.	C. V.
E.I.. Males	5.26	.0733
E.II. "	5.28	.0724

This is only one case in a number where one group shows greater variability by the σ, but less variability according to the C.V.

Thus the C. V. cannot be used as a universal measure of variability.

We will now proceed to a consideration of the precise condition of the species P. lapillus at the present time on the Atlantic Coast.

In the foregoing tables, we have data from localities which differ in geographical position and which differ also in physical conditions; the data in regard to the animals of each sex are kept separate; and the data concern a number of different structural characters. As previously stated, the measurements gathered in each table, when plotted, give a normal curve of frequency. From this we may conclude that we have in each locality a homogeneous population, and we may feel reasonably sure that our data are reliable, and that the means and standard deviations of these curves give us true pictures of the average condition and degree of variability of the different characters in each locality. Thus we are prepared to answer certain questions that

naturally suggest themselves in connection with this inquiry:--

First, does the homogeneity found in each locality extend throughout the range of the species, or do we find differences associated with geographical position?

Second, are structural differences to be found associated with differences in the environment?

Third, is there any evidence of sexual dimorphism?

Fourth, what correlations are to be found in the variations of different characters?

And finally, is there any one character that is more constant than the others, or any one by which the species may be divided into distinct races, or varieties?

These questions will now be taken up in order.

First,- Is the species P. lapillus homogeneous and continuous, i. e., do the characters vary about the same points, no matter from what locality the shells may be taken, or is the species heterogeneous and discontinuous, i. e., do the characters of the species vary about different points in different localities? This question can be determined by comparing the modes of several characters in more than one locality and noting the degree of difference. Below are placed for comparison two characters from Eastport and corresponding characters from Gloucester.

Mode of Nuclear Angle, Eastport,	(537 specimens)	75.1°
" " " " Gloucester,	(364 ")	84.5°
	Difference,	11.4°

Mode of Shape Ratio, Eastport, 38.2 %
" " " " Gloucester, 31.5 %

Difference, 6.7%

A difference of 11.4 in the nuclear angle, and of 6.7% in the shape of the shells in the two localities clearly shows that the species is discontinuous. It varies about different points in different localities. This shown in a still more striking manner by the following tables, which are descriptions of the species in three localities:-- Eastport, Gloucester and Newport, respectively, expressed in quantitative terms:

S. D. below means standard deviation.

Shells from Eastport (Collection of 537 specimens) may be described as follows:

The shell has a mean nuclear angle of	75°,	S. D. 4.67	
" " adult " "	73°,	S. D. 5.28	
" shape ratio of	38%,	S. D. 3.48%	
" total length of	27m.m.,	S. D. 3.58 m.m.	

and presents imbrications to the extent of	c.	19%
teeth " " " "	"	1%
sutures " " " "	"	61%
ribs " " " "	"	64%
columella excavation,	"	74%

Color, dark brown to light buff.

Shells from Gloucester (Collection of 364 specimens):

The shell has a mean nuclear angle of	85°,	S. D. 6.47
" " adult " "	85°,	S. D. 6.30
" shape ratio of	31%,	S. D. 4.54%
" total length of	19m.m.	S. D. 2.96 m.m.

and presents imbrications to the extent of	c.	0.5%
teeth " " " "	"	25. %
sutures " " " "	"	31. %
ribs " " " "	"	35. %
columella excavation,	"	64. %

Color, pure white, rose-pink and % striped shells.

Shells from Newport (Collection of 195 specimens):

The shell has a mean	nuclear angle of	71°.
" "	adult " "	72°.
" "	shape ratio of	38%.
" "	total length of	23 m.m.

and presents	imbrications to the extent of	c. 10%.
	teeth " " " "	" 27%.
	sutures " " " "	" 19%.
	ribs " " " "	" 86%.
	columella excavation,	" 51%.

Color, of a uniform brick-yellow.

It will be observed that in these descriptions not a single character retains the same mean in the several localities. The lots from Eastport and Newport resemble each other much more than either resembles Gloucester. The principal points of difference between them being that Eastport shells are more strongly sutured, having more excavated columella, are not dentate, and are 4m.m. longer, while the Newport shells are 27% dentate, and more strongly ribbed. Again, the shells from Eastport differ from those of Glcucester in the following manner:-- On an average, Eastport shells are 8m.m. longer, 12 more acute, 7% less kite-shaped, more strongly ribbed, less dentate and more imbricated, and of a uniform brown color as against almost uniform white in Gloucester. The shells from Newport differ from those of Gloucester in the following manner:-- The color is of a uniform brick-yellow, as against white or banded white at Gloucester. The shells of Newport are more strongly ribbed, on an average 13° more acute, and more strongly imbricated.

Not only does the mean of any character differ with location; but a comparison of the standard deviations from two localities shows also a difference in the extent of variability. The reader will recall the fact that a large standard deviation means much variability, while a small standard deviation means little variability. In the following table, the specimens from Eastport and from Gloucester are compared with regard to the standard deviations of their nuclear angles, adult angles and shape ratios:

Standard Deviation, Nuclear Angle,	EASTPORT,	4.67°
" " " "	GLOUCESTER,	6.47°
" " Adult "	EASTPORT,	5.28°
" " " "	GLOUCESTER,	6.30°
" " Shape Ratio,	EASTPORT,	3.48%
" " " "	GLOUCESTER,	4.54%

It will be noticed that the standard deviation for the Gloucester specimens in each case exceeds the corresponding standard deviation of the Eastport specimens, showing very clearly a greater average variability in Gloucester. Again, the majority of shells have neither imbrications nor teeth, so the higher the percentage of shells in any locality that have these characters the greater the variability there. The following table will show that the Gloucester forms are again more variable than those from Eastport in regard to imbrications, but in regard to the presence of teeth they are just the reverse:

GLOUCESTER, (364 specimens);
Percentage of shells imbricated, 0.55%

EASTPORT, (537 specimens);
Percentage of shells imbricated, 18.99%

GLOUCESTER, (364 specimens);
Percentage of shells having teeth, 25.27%

EASTPORT, (537 specimens);
Percentage of shells having teeth, 0.98%

Second,- Are structural differences to be found associated with differences in the environment?

At Eastport, collections were made at two points, at which, as stated in the descriptions of localities, the physical conditions differ in a marked degree. This affords an excellent opportunity to compare the species in two stations of a different character lying within the same part of the range.

Comparing the mean nuclear angle in the two stations, we find;-

Mean Nuclear Angle, Eastport I.(101 specimens), 74.26°
" " " " II.(110 "), 75.86°

Difference, 1.60°

Shells from Eastport I. may be contrasted with those of Eastport II. in the following way, the (to me) most striking differences being enumerated first. The first station is quiet compared to the second. The total length of the shells of Eastport I. is greater by 4m.m., the shape is 3% less kite-shaped, slightly more imbrications and the nuclear angle is 2° more acute. It is interesting to note that the character ribs which is such an excellent differential in separating the three localities,-Eastport, Gloucester and Newport-, is practically undifferentiated between Eastport's two stations, the values being 64.36% and