Studies on New Zealand Elasmobranchii. Part V.
Scymnodalatias n.g. Based on *Scymnodon sherwoodi* Archey, 1921 (Selachii)*

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Abstract

Scymnodalatias n.g. has small brush-shaped dorsal fins lacking dorsal spines; the 1st dorsal placed about halfway along the total length, the tail with an upraised axis and moderately developed epiural lobe; the pectoral fins with pointed anterior angles; the teeth one-cusped and dissimilar, the uppers needle-like with asymmetrical twisted cusps, and the lowers erect with high, straight-edged, triangular cusps.

Data on the position of the 1st dorsal fin in forty-eight squaloid species shows that in the Dalatiidae, and including the "squalid-like" dalatiids, this fin is generally more posterior than in the Squalidae.

In June, 1920, a small shark was found on the New Brighton beach, Canterbury, by Mr. C. W. Sherwood, who presented it to the Canterbury Museum. This specimen, a male of 803 mm total length, formed the basis for the description of a new species, *Scymnodon sherwoodi*, described by Dr. G. E. Archey in 1921. No further specimens have been recorded, nor is there any additional information on the species other than that given in this original description. Phillipps (1928, p. 225; 1946, p. 17), Whitley (1934, p. 200; 1940, p. 150), Fowler (1941, p. 227), Bigelow, Schroeder and Springer (1953, p. 232) and Richardson and Garrick (1953, p. 35) list the species or give accounts of it adapted from the original description, and retain it in the g. *Scymnodon* and hence in the family Squalidae as at present recognised. Evidence given below does not support this systematic position, but suggests that *sherwoodi* should be included in the family Dalatiidae.

The criteria of the g. *Scymnodon* are essentially as follows:—The absence of an anal fin; the presence of dorsal fin-spines lying more or less along the anterior margins of the dorsal fins; the upper and lower teeth one-cusped and dissimilar, the uppers awl-shaped or lanceolate, the lowers blade-like; the pectoral fins with rounded posterior angles, and the dermal denticles with dentate posterior margins. Archey's (1921) description and figures of the type of *Scymnodon sherwoodi* agree with the above. The fish is rather deep-bodied, considerably tapered anteriorly towards the pointed and somewhat depressed snout, and has a short, slender caudal peduncle. The tail has a moderately upturned axis with well developed lobes, the epiural with a convex anterior margin and an oblique concave posterior margin, well separated from the deep triangular hypural and with an obtuse subterminal notch. The dorsal fins are small and brush-shaped, the 1st smaller than the 2nd, and both placed well back along the trunk, with each preceded by a dorsal spine which according to Archey are "scarcely discernible rudiments imbedded in the skin". The pectoral

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fins are small, leaf-shaped, with pointed anterior and smoothly rounded posterior angles. When the pectorals are laid back along the trunk they fail to reach the level of the origin of the 1st dorsal by a distance slightly greater than their own length. The pelvics originate just anterior to the 2nd dorsal origin and are similar in shape to it. On their posterior margins they carry small claspers, each extending a little behind the posterior tip of the fin, and bearing a short subterminal lateral spur. The gill-openings are vertical, subequal and about equidistant, and arranged in a horizontal series anterior to the pectoral origin. The spiracles are large and placed above and behind the eyes The nostrils are oblique, and placed well anterior and close to the lateral margin of the snout. The mouth is broad and short, with the angles bordered by prominent labial furrows. The teeth, as seen in Archey's view of the ventral surface of the head, are numerous and one-cusped, the uppers needle-like, the lowers triangular and blade-like. The dermal denticles have tridentate ridged blades borne on pedicles.

Re-examination of the type of *Scymnodon sherwoodi* does not support its diagnosis as a *Scymnodon* The type, which has been made available to me through the courtesy of Dr R. S Duff, Director of the Canterbury Museum, is in a very poor state of preservation, having obviously been desiccated at some time, and is consequently shrunken and distorted. However, a cast of the specimen, also in the Canterbury Museum, gives a reasonable indication of its original condition and dimensions, and this, together with detailed information on the teeth, denticles, etc., from the type forms the basis for the following account of the species and its systematic position

I am unable to locate in the type any structure which can be identified as a dorsal fin spine preceding either the 1st or 2nd dorsal fin. The anterior margins of the dorsal fins are uninterrupted, so that the spines, if present, would have to be below the surface of the skin, as indicated by Archey (1921, p 196). Dissection of this region shows no identifiable spine-like structure. There is no indication that spines have been removed. It is suggested, accordingly, that the "rudimentary spines" described by Archey represent the most anterior of the radial cartilages supporting the dorsal fins which he had exposed by a short incision; for by extending the incision posteriorly to expose the succeeding radials, their true nature became obvious.

The significance of this lack of dorsal fin spines is that if the current classification of the Squaloidea is followed, the species should be included in the family Dalatiidae. In none of the Squalidae, including *Scymnodon*, are the dorsal spines entirely lacking, though they may be reduced so as to barely protrude as in *Centroscymnus*, or at most as in *C. cryptacanthus* where they are concealed by the skin. In contrast, dorsal spines are entirely lacking in all of the Dalatiidae with the exception of *Squaliolus* in which a reduced and sometimes hidden 1st dorsal spine is present.

The division of the Squaloidea into the Squalidae and Dalatiidae (plus Echinorhinidae) depending on the presence or absence of dorsal fin spines has been queried on the grounds that the groupings obtained in this manner are not natural ones. In particular, Hubbs and McHugh (1951, p 163) believe that a loss of dorsal fin spines has occurred in several genera within the Squaloidea and that the resulting similarity between these genera which are now grouped together as the Dalatiidae is due to convergent evolution. They support this contention by pointing out that the lack of dorsal fin spines is almost the only

diagnostic feature separating the squalid genus *Centroscymnus* from the dalatiid genus *Somniosus,* and that "other genera referred to the Squalidae and Dalatiidae are rather similarly paired". Their opinion is that such similarities are more important than the lack of dorsal spines used to associate *Somniosus* with the other dalatiids. This warrants further consideration because the Dalatiidae are a heterogeneous assemblage of squaloid genera with virtually no recognised diagnostic features binding all of them together other than the lack of dorsal spines. There are certainly characters which link some of the genera, as for example the short, blunt head profile, and the erect, heavy triangular cusped teeth of *Dalatias* and *Isistius* Similarly the peculiar expanded caudal fin with no distinct subterminal notch, the almost transverse mouth and the very long lateral labial furrows are common to *Isistius*, *Squaliolus* and *Euprotomicrus*. These features do not occur in the Squalidae, and consequently there does seem to be some justification for separating and grouping together the genera which have them. The real problem with the Dalatiidae does not, however, lie with these obviously distinct genera, but with the " squalid-like" dalatiids, *Somniosus* and *Heteroscymnus,* which are essentially similar to the squalid genus *Centroscymnus.* Thus they do not have the "dalatias-type" of teeth, nor the strongly blunt snout profiles, nor the expanded caudal, nor the long labial furrows, etc., and in fact possess no positive characters linking them with the Dalatiidae other than the lack of dorsal fin spines, and the presence of sessile dermal denticles—though this latter character is not confined to the dalatiids but occurs also in some of the squalids and particularly *Centrophorus.*

Hubbs and McHugh suggest that because of the above, the Dalatiidae (and the Echinorhinidae) be fused with the Squalidae with perhaps a provisional retention of these two groups as sub-families, the Dalatiinae and Echinorhininae, "pending thorough morphological studies and a general revision of the squaloids" The provision of only one family Squalidae, for all the squaloids seems undesirable as it swamps the obvious distinctions between the currently recognised Squalidae and the majority of the Dalatiidae. Although the Dalatiidae may yet not prove to be a natural group, bearing in mind our lack of knowledge of some of the genera there is no disadvantage in retaining it as a distinct family until further investigations provide a basis for handling it in a different manner.

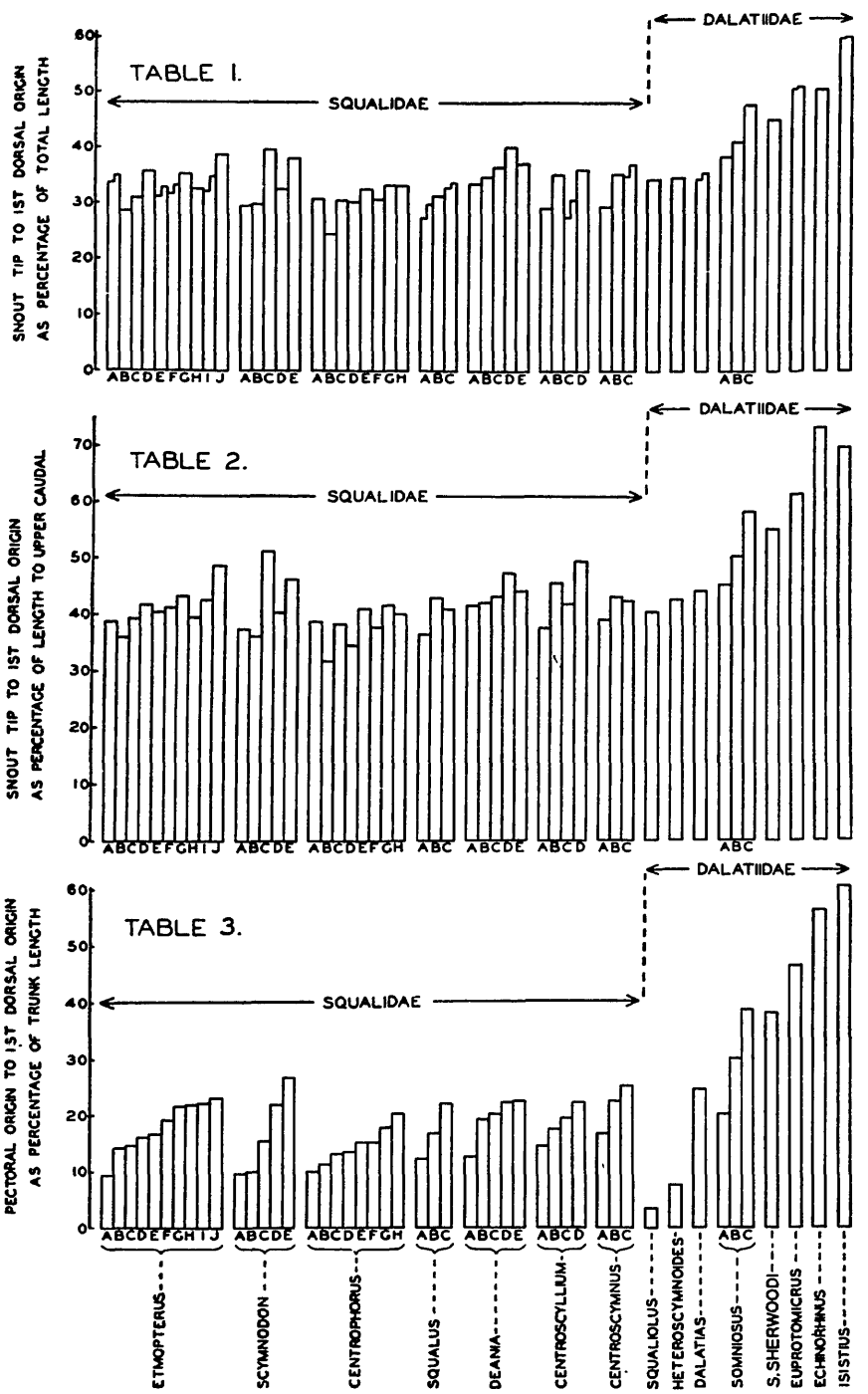
One feature of the squaloids, and of the dalatiids in particular, which appears to offer possibilities in adding to our knowledge of the relationships of these fishes, is the variation in position of the 1st dorsal fin between the various genera. This feature has not been used on a comparative basis although the majority of authors recognise the distinctly posterior position of the 1st dorsal in some of the dalatiids. White (1937, p. 52) in her study on the interrelationships of the elasmobranchs, states that "the position of the dorsal fin (in all elasmobranchs) has been strangely constant, but the constancy is not absolute, so that it has been a dangerous tool in making certain assignments". Although the latter are not specified, it is obvious that White is referring, at least in part, to Garman's (1913) assignment of *Calliscyllium venustum* to the genus *Triakis* and hence to the family Galeorhinidae, and *Pseudotriakis microdon* to a separate family Pseudotriakidae, for she quotes these species in a discussion of the problem (p. 54). White places these species in the " primitive" families Halaeluridae and Catulidae (and retains the genus *Calliscyllium* for *C. venus-*

tum), because she believes that they differ from the other members of these families only in the more anterior position of the dorsal fins. Such differences, according to White, are due only to variation which "is more active in primitive than in specialised groups", so that the position of the dorsal fins is of little use in taxonomy except in specialised and stable groups, for "in the more primitive groups which vary widely it is of little value". Such a postulate is reconcilable with current views on evolutionary trends, though the examples selected by White to illustrate it may not be valid ones—for more recent workers, including Fowler (1941) and Bigelow and Schroeder (1948) have retained the systematic positions selected by Garman for *Triakis venusta* and *Pseudotriakis microdon*.

White (p. 53) states further that "the position of the dorsal fins is correlated with the mode of locomotion", and accordingly distinguishes those sharks with both dorsals behind the pelvic fins from those with the 1st dorsal anterior to this level. The former group, exemplified by the Catuloidea and Orectoloboidea, are said to be able to hold the posterior part of the body steady " while swishing the forward part from side to side in search of prey", and are characteristically small, with long tails (typically longer than the body), narrow mouth gapes, and a littoral habit. In contrast, the latter group with an anterior dorsal fin, such as the Isuroidea and Carcharinoidea, are of large size, with fusiform bodies and narrow heads suited for swift motion, large triangular mouths, and a pelagic habit.

The above interpretation is oversimplified, and cannot be used to explain with any success the position of the dorsal fins in a very large number of sharks, and particularly in the Squaloidea, where a majority of the species have the first dorsal anterior in position, but do not fit the criteria of large, swift pelagic sharks with wide gapes. If there is a strong correlation between the position of the dorsal fins and the method of locomotion, then in view of the similarity of habit of the majority of the squaloids, one would expect to find stability in the position of these fins Such is not always the case, as will be seen later Even in the two pelagic dalatiid species, *Squaliolus laticaudatus* and *Euprotomicrus bispinatus*, there is a marked difference in the position of the dorsals It is obvious that some factor other than correlation with the mode of locomotion is involved in determining the position of these fins.

In an attempt to get an overall picture of the variation in the position of the first dorsal fin in the Squaloidea, and to see where Archey's *sherwoodi* fitted into such a picture, data have been extracted from forty-eight squaloid species, comprising thirty-eight squalids, eight dalatiids, Archey's *sherwoodi* and *Echinorhinus brucus*. Where possible type descriptions have been used The number of examples selected is not arbitrary, but includes all specific descriptions readily available to me, giving precise information on the 1st dorsal origin, or including illustrations from which it can be calculated with reasonable accuracy The latter source has had to be used in the majority of cases. The species of *Oxynotus*, and some of those of *Deania*, have such obscure dorsal origins, or are so illustrated that no attempt has been made to include them in this survey. Furthermore, no attempt has been made to get data from more than one source for each species, nor has the size of the specimens described been taken into account. Consequently variations in the position of the 1st dorsal origin within each species or with growth of each species is neglected except



TABLES I–III.

The species represented are:

SQUALIDAE:

Etmopterus: A. *polli*, B. *spinax*, C. *lucifer*, D. *brachyurus*, E. *lucens*, F. *schultzi*, G. *hillianus*, H. *molleri*, I. *princeps*, J. *villosus*.
Scymnodon: A. *jonssoni*, B. *foliaceus*, C. *rossi*, D. *plunketi*, E. *squamulosus*. *Centrophorus:* A. *steindachneri*, B. *armatus*, C. *atromarginatus*, D. *squamosus*, E. *uyato*, F. *acus*, G. *harrissoni*, H. *scalpratus*. *Squalus:* A. *cubensis*, B. *fernandinus*, C. *acanthias*.
Deania: A. *natalense*, B. *hystricosa*, C. *rostrata*, D. *quadrispinosa*, E. *aiculata*. *Centroscyllium:* A. *ritteri*, B. *nigrum*, C. *fabricii*, D. *ornatum*. *Centroscymnus:* A *waitei*, B. *owstoni*, C. *coelolepis*.

DALATIIDAE:

Squaliolus laticaudatus. *Heteroscymnoides marleyi*. *Dalatias licha*. *Somniosus:* A. *antarcticus*, B. *microcephalus*, C. *pacificus*. "*S*" *sherwoodi*. *Euprotomicrus bispinatus*. *Echinorhinus brucus*. *Isistius brasiliensis*.

in a very few cases where it has been given by the author of the description. Such variation as recorded by Bigelow and Schroeder in various studies on eleven species included in this survey, is of a small range, as is shown here in Table I—e.g., the species of *Etmopterus* listed as A, E, F, etc.

The usual method of expressing numerically the position of the 1st dorsal origin is to give the distance from the snout tip to the 1st dorsal as a percentage of the total length. This has been done for the species in this survey and the relevant percentages are shown in Table I. A further set of percentages in Table II gives the distance from snout tip to 1st dorsal as a percentage of the length to the upper caudal, thereby giving a truer picture of the position of the 1st dorsal relative to the head and trunk region and avoiding the complications produced by variations in the tail length in different species. In Table III this process is carried a step further, and variations in head lengh are excluded by giving the distance from pectoral origin to the 1st dorsal origin as a percentage of the distance from the pectoral origin to the upper caudal, this latter distance being called the *trunk length* throughout the remainder of this paper. These tables show that specific differences in the position of the first dorsal are clear when the position is expressed in terms of the trunk length—e.g., *Squaliolus laticaudatus*. The arrangement of the species and genera in Tables I and II is not random, but is based on Table III, where for firstly the Squalidae and secondly the Dalatiidae, the species with the most anterior 1st dorsal and hence the lowest percentage is placed first, followed by the remaining species of the same genus according to their increasing percentages. The second genus to be selected is that which includes the species with the next lowest percentage, and so on. Naturally enough the same specific and generic arrangement in Tables I and II does not produce the same ordered distribution of percentages as in Table III. Because Archey's *sherwoodi* lacks dorsal fin spines, it has been placed with the Dalatiidae in all three tables. For the sake of convenience, *Echinorhinus brucus* has also been included in this group even though it is placed in a separate family by the majority of authors. A key to the species indicated alphabetically within each genus in the tables is given in the legend.

Table I shows that the Squalidae are a compact group with the 1st dorsal origin well anterior to the middle of the total length, the variation in its position being comparatively small, and only about 16% of the total length, with the distance from snout tip to 1st dorsal varying between 24.3% (*Centrophorus armatus*) and 40% (*Deania quadrispinosa*) of the total length. Moreover, there is a good scatter between these two extremes. The Dalatiidae on the other hand show a variation in 1st dorsal fin position of 25% of the total length, the predorsal length varying from 34 2% (*Dalatias licha* and *Squaliolus laticaudatus*) to 59 5% (*Isistius brasiliensis*), and thus are less compact and have the 1st dorsal generally more posterior than in the Squalidae. Furthermore the dalatiid species fall into two groups relative to the Squalidae in this table, the first group including *Squaliolus, Heteroscymnoides* and *Dalatias* in which the predorsal length percentages are between 34% and 36% and hence similar to those in the majority of the Squalidae, and the second group comprising *Somniosus, Euprotomicrus, Isistius, "S." sherwoodi* and *Echinorhinus*, in which the percentages are at least 40% and mostly greater. In *Somniosus antarcticus* the percentage is only 38 1%, but not too much reliance can be placed on this figure, as the only data available for this species are Hamilton's sketch

and notes (in Waite, 1916, pp. 51–52, Fig. 10) of a specimen washed ashore at Macquarie Island. The percentage for *"S." sherwoodi* is 44 7%, and thus well within the limits of the more distinct group of dalatiids, with the 1st dorsal placed well back.

Table II shows essentially the same features as Table I. Again the Squalidae are compact, though the variation in the percentages is numerically greater, being about 20% of the length to the upper caudal. The lowest percentage is 31 6% (again in *Centrophorus armatus*) while the highest is 51 1% (*Scymnodon rossi*). In the Dalatiidae the variation is 29% (excluding *Echinorhinus brucus* which would otherwise increase the variation to 33%), the lowest percentage is 40·6% (*Squaliolus laticaudatus*) and the highest 69 6% (*Isistius brasiliensis*). In *Echinorhinus brucus* the percentage is 73 1%. The same overlap occurs between the percentages of the Squalidae and those of *Squaliolus, Heteroscymnoides* and *Dalatias,* but in addition *Somniosus antarcticus,* and *S. microcephalus* are included. The remaining dalatiids, *Somniosus pacificus, Euprotomicrus, Isistius* and *"S." sherwoodi* are again distinct, their percentages varying from 55 1% (*"S." sherwoodi*) to 69 6% (*Isistius*).

Table III gives rather a different picture, at least for some of those dalatiids which in Tables I and II overlapped with the Squalidae The Squalidae themselves show little change, with the position of the 1st dorsal varying over a distance equal to 17% of the trunk length. In *Etmopterus polli* the 1st dorsal is furthest forward, the percentage being 9 3%, while in *Scymnodon squamulosus* the fin is furthest back and the percentage 26 6%. The Dalatiidae, however, show a variation in fin position of 57% of the trunk length, from 3 4% (*Squaliolus laticaudatus*) to 60 4% (*Isistius brasiliensis*). Moreover, instead of there being two groups of dalatiids relative to the squalids, as seen in Tables I and II, there are now three groups evident. The first of these includes *Squaliolus* and *Heteroscymnoides* in which the 1st dorsal is further forward on the trunk than it is in any of the Squalidae, so that the percentages are low, being 3 4% and 7 6% respectively. The apparent similarity between these two genera and the Squalidae as seen in Tables I and II is obviously misleading and due to the exceptional length of head of *Squaliolus* and *Heteroscymnoides* when compared to the Squalidae Thus the exclusion of the head (and the tail) length in Table III gives a truer picture of the position of the 1st dorsal.

The second group of dalatiids in Table III comprises the type genus *Dalatias,* and possibly *Somniosus antarcticus.* The percentages for these are 24 4% and 20 0% respectively, and thus are well within the limits of many of the Squalidae. One would expect to find in the species of this group of dalatiids, the core of the dalatiid characters if such do exist for the Dalatiidae as currently recognised. Such characters are obvious in *Dalatias,* but their equivalents are lacking in *Somniosus antarcticus,* though the inadequacy of the data on the latter species, particularly with regard to the precise position of the 1st dorsal, is perhaps sufficient justification for excluding this from further discussion.

The third group of dalatiid species includes *Somniosus microcephalus* and *S. pacificus, Euprotomicrus, Isistius, "S." sherwoodi* and *Echinorhinus,* with percentages varying from 29 8% (*Somniosus microcephalus*) to 60·4% (*Isistius brasiliensis*). The highest percentage in the Squalidae in Table III is 26 6% for *Scymnodon squamulosus,* so that the gap between this species and *S. microcaphalus* is only 3 2%. However, *S pacificus* has a considerably higher per-

centage, 38 4%, which gives a gap of 11·8%. In *"S." sherwoodi,* the percentage is 38·0%, which is well above that of any of the Squalidae.

The above data appears to give little justification for regarding the Dalatiidae as a natural group when compared in this respect with the Squalidae. There is a marked distinction shown in Table III, between *Squaliolus* (3 4%) and *Euprotomicrus* (46 2%). This greatly exceeds the range in the Squalidae and favours Hubbs' and McHugh's (1951) retention of *Squaliolus* and *Euprotomicrus* as separate genera, contrary to the opinions of Garman (1913, p. 234), Bigelow and Schroeder (1948, p. 500), and Fowler (1941, p. 264) who synonymised them. At the same time it seems significant that four at least of the eight dalatiids included in this survey (excluding *Echinorhinus* and *"S." sherwoodi*) should have the 1st dorsal origin considerably more posterior in position than is the case in any of the Squalidae, and should at the same time lack dorsal spines. Since *"S." sherwoodi* is at present to be regarded as a dalatiid because of the absence of dorsal spines, then this is confirmed in the posterior position of the 1st dorsal which is placed further back than in any of the Squalidae. Excluding *Somniosus antarcticus,* there is a total of five dalatiids out of eight in which the 1st dorsal is posterior. The affinities of *Dalatias,* which has the fin in the same position as in the majority of the Squalidae but lacks spines and is separable from the Squalidae in some other respects also, are at least as much if not more with these five dalatiids than they are with any of the Squalidae.

Hubbs and McHugh (1951) propose that the "squalid-like" Dalatiidae are derived from squalid ancestors similar to those existing to-day. This conclusion can be drawn if the loss of the "characteristic" squalid predorsal spines only is considered; but the above analysis of the position of the 1st dorsal shows for *Somniosus* and *"S." sherwoodi* the 1st dorsal has not only lost its spine but has itself "shifted" to a much more posterior position. If a squalid ancestry for the Dalatiidae is recognised, it would be reasonable to expect that the 1st dorsal position would in general be that of squalids—i.e, somewhat anterior, for not only is the loss of a spine involved, but transition must affect even the far more developmentally stable tissues, the innervation of the fin, the musculature and the skeleton The uniformity in the position of the 1st dorsal in the Squalidae has appeared in the above analysis. It contrasts with the range in position of this fin in the Dalatiidae, which are much less uniform in this respect than the Squalidae. It is unlikely that a group which is uniform in such a character would be ancestral to one which is less uniform. The Dalatiidae on the other hand, do provide several genera suitable in this respect, one or another, as ancestor-forms for the Squalidae, though a claim for the derivation of the Squalidae from the Dalatiidae has little evidence to support it other than that the Dalatiidae are less uniform.

Fossil evidence for the derivation of the Squalidae from the Dalatiidae or vice versa is meagre. The earliest known representatives of both these families occur in the Upper Cretaceous; and the only earlier known squaloid species is *Protospinax annectans* Woodward, 1918, an Upper Jurassic species with an anal fin, and two dorsal fins each of which is preceded by a dorsal spine. This species is placed in a separate family, the Protospinacidae. Berg (1940, p. 381) queries the validity of the anal fin, which could conceivably be a portion of the hypural lobe of the tail. If the latter is true, then there is considerable justification

for regarding the Squalidae as derivatives of spined ancestors such as *Protospinax.* However, the position of the dorsal fins in *Protospinax,* in which the 1st dorsal arises just behind the origin of the pelvic fins, suggests that this posterior position is the primitive condition for the squaloids as a whole, and hence supports the case for the primitive nature of the Dalatiidae.

The simplest postulate which can be put forward to reconcile the differing views on the relationships of the squaloids would appear to be that the Dalatiidae stemmed from protospinacid or squalid ancestors by the loss of dorsal spines very early in the evolution of the Squaloidea and before the capacity for changes in the position of the dorsal fin had been lost; while the Squalidae are derived from related ancestors in which the position of the dorsal fin had become more or less stabilised. Such an explanation is consistent with our knowledge of the Squaloidea, but in so far as much of it depends on supposition because of the inadequacy of this knowledge, it cannot be put forward without reservation.

The relationships of the dalatiid genera are certainly not clear, but on the basis of the above discussion there is justification for retaining them in a distinct group until further evidence becomes available. Although such a group does not now appear to be as natural a group as the Squalidae, it merits retention for reasons other than mere expediency.

The lack of dorsal fin spines and the posterior position of the 1st dorsal fin are sufficient reason for including *"S." sherwoodi* in the Dalatiidae, though further evidence for this systematic position is found in the teeth of this species. In *"S." sherwoodi* the lower teeth are one-cusped, with high rectangular bases and elongate, triangular, smooth-edged, blade-like cusps. The cusps are erect at the centre of the jaw but oblique towards the angles. The majority of the cusps, excluding the few at the angles, are straight-edged, although slightly oblique Similar though rather heavier and broader teeth occur in *Dalatias* and *Isistius,* though in the former genus the cusps have a serrated edge. In contrast, the lower teeth in *Scymnodon* species, and in other squalids with one-cusped and dissimilar teeth, have shorter and more oblique cusps with sinuous rather than straight edges. *Scymnodon squamulosus* appears to be an exception in that the cusps are straight-edged, at least in the teeth at the centre of the jaw, as shown in the illustration in Gunther (1887, Pl. II, Fig. B).

The upper teeth of *"S." sherwoodi,* with their needle-like asymmetrical, apparently twisted cusps, differ from those of any other squaloid species known to me. Long-cusped slender teeth do occur in many squaloid genera, both in the Squalidae and Dalatiidae, but those of *Scymnodon* and of the dalatiid genera are either awl-shaped or lanceolate, without a twisted appearance, and are shorter and stouter than in *"S." sherwoodi.*

The pectoral fins of *"S." sherwoodi* are small and rather leaf-shaped, with short posterior margins, and with the distal portion of the web little expanded while the anterior angles are extended and sharply rounded so as to give them a pointed appearance. Similar pectoral fins are evident in *Dalatias, Isistius* and *Somniosus,* and appear to differ slightly from the longer and larger-webbed pectorals in the Squalidae. Quantitative data on this feature are, however, too meagre for worthwhile comparison for most of the species, and the method of presentation of the pectorals in most illustrations often masks their true shape and thus gives little possibility of assessing their value as distinctive features. In Gunther's illustration of *Scymnodon squamulosus* (1887, Pl. II,

Fig. B) the pectorals appear to be small, though there is no indication of their shape.

Comparing "*S.*" *sherwoodi* with the dalatiids as recognised by Hubbs and McHugh (1951) and using the data given in their analytical key of the family, there is a similarity in general appearance and overall morphological characters between this species and *Dalatias, Somniosus* (and *Heteroscymnus*). I have no illustration of the last genus but Hubbs and McHugh (1951, p. 164, footnote) indicate its close similarity to *Somniosus* by suggesting that detailed examination of the teeth and denticles may show it to be synonymous. The features in which these genera and "*S* " *sherwoodi* agree are as follows:—The axis of the tail more or less strongly raised; the epiural lobe not greatly expanded and with a prominent subterminal notch; and the mouth moderately arched and bounded by relatively short labial furrows. In contrast to the above, the remaining dalatiid genera—*Isistius, Heteroscymnoides, Squaliolus* and *Euprotomicrus*—are characterised by having the axis of the tail scarcely raised; the epiural lobe greatly expanded; the subterminal notch obsolescent; and the mouth almost transverse and bounded by very long lateral labial furrows.

Reviewing the relationships between "*S* " *sherwoodi* and those genera with which it is most similar—viz.. *Dalatias, Somniosus* and *Heteroscymnus,* it differs from *Dalatias* in the more pointed snout; the more posterior origin of the 1st dorsal fin; the smaller size of the dorsal fins; the more obtuse subterminal notch; the more pointed anterior angle of the pectoral; the distinctions of the teeth already mentioned; and the dermal denticles. From *Somniosus* and *Heteroscymnus,* "*S.*" *sherwoodi* differs in the more obtuse subterminal notch; the more pointed angle of the pectoral; the teeth, of which the uppers are more needle-like in "*S.*" *sherwoodi,* while the lowers are erect and not oblique as they are in *Somniosus* and *Heteroscymnus;* and in the details of the denticles.

The denticles of "*S.*" *sherwoodi* have tridentate, ridged blades borne on pedicles, and though they are similar to those of many of the Squalidae, they differ from the sessile, quadrate or triangular denticles of the Dalatiidae.

On the basis of the lack of dorsal spines, the posterior position of the 1st dorsal fin, the nature of the teeth, and the size and shape of the pectorals, I propose *Scymnodon sherwoodi* Archey (1921) as the type of a new genus *Scymnodalatias* within the Dalatiidae and differing from the known genera in the features given above.

Scymnodalatias n.g.

Dalatiidae with small brush-shaped dorsal fins lacking dorsal spines, and the 1st dorsal placed about half way along the total length. The tail with an upraised axis, a moderately developed epiural lobe, and a distinct subterminal notch. Pectoral fins with pointed anterior angles. The teeth one-cusped and dissimilar, the uppers needle-like, with asymmetrical twisted cusps, the lowers erect with high, smooth, straight-edged, triangular, blade-like cusps. The denticles with ridged dentate blades borne on pedicles

Scymnodalatias sherwoodi (Archey), 1921. Text-fig. 1, figs. A-L; Text-fig. 2, figs. A-E

Study Material.

Holotype, mature male, 803 mm total length, found on New Brighton beach, Canterbury, in June, 1920, and presented to the Canterbury Museum by Mr. C. W. Sherwood. Also plaster cast of holotype in the Canterbury Museum.