did whitish somewhat infuscated; beneath fuscous with a narrow irregular white central area.

Male genitalia.—Almost symmetrical. Ventral lobes of both harpes greatly reduced, dorsal members slender, pointed. Gnathos a long, slender curved process. Uncus slender, divided apically. Aedeagus with strongly sclerotized, spinous processes on the left side, and one thornlike process on the right side.

Female genitalia.—Signum with a single long dentate process.

Alar expanse, 17–20 mm.

Type.—U.S.N.M. no. 58252.

Type locality.—Paradise, Cochise County, Ariz.

Remarks.—Described from the male type, three male and four female paratypes from Arizona as follows: Paradise, Cochise County, four males, two females (April 1–7; no year or collector); Redington, two females (no further data). Paratypes in the U. S. National Museum and the British Museum.

Of the species described in this paper *obidenna* is nearest to *virgea*, but is probably more nearly related to *albicostella* Clarke.

Fascista bimaculella (Chambers), n. comb.

Gelechia bimaculella Chambers, Can. Ent. **4**: 108. 1872.
Gelechia (? *Lita*) *ternariella* Zeller, Verh. zool.-bot. Ges. Wien **23**: 264. 1873.
Gelechia sylvaecolella Chambers, U. S. Geol. Geogr. Surv. Terr. Bull. **4**: 86. 1878.
Filatima bimaculella (Chambers) Busck, Proc. U. S. Nat. Mus. **86**: 576. 1939.

Busck referred this species to *Filatima*, but a study of the genitalia reveals that *bimaculella* should be assigned to *Fascista*.

ICHTHYOLOGY.—*American species and subspecies of* Bathygobius, *with a demonstration of a suggested modified system of nomenclature.*[1] ISAAC GINSBURG, U. S. Fish and Wildlife Service. (Communicated by ELMER HIGGINS.)

The chief aim of this paper is to characterize briefly the American species and subspecies of fishes belonging to the genus *Bathygobius* and formally establish the names for these categories. The conclusions here epitomized are based on a detailed study of samples of the American populations[2] comprising, in the aggregate, over 800 specimens. The data have been tabulated, and of the characters studied the main ones of those that have proved pertinent to a taxonomic division of the populations are here employed. Some of the most important characters here used were, either altogether or partly, not taken into account by previous authors. Characters determined in this study which proved to be of secondary importance, and size and sex differences in proportional measurements (which are sometimes considerable), are generally omitted in this preliminary, condensed account. The populations of *Bathygobius* are here classified in accordance with what seems to be the proper interpretation of the totality of my voluminous data. The names of the taxonomic categories here established will prove to be of much help in the further study of the populations, by the proper labeling of the considerable amount of permanently preserved museum material that has been studied, and their use in discussion and correspondence.

Bathygobius is in an early stage of speciation at the present time level. The divergence of the species is of a low degree of magnitude in general. The divergence of some of the closely related and immediately contrasting populations is near the borderline between species and subspecies, and they may be designated either as full species or as subspecies, depending on a subjective estimate made by a given author. Furthermore, the species and subspecies are more or less heterogeneous, sometimes markedly so. Every minor local population shows its distinctive frequency distribution in one or more characters. The divergences of the local populations are of different degrees of magnitude and it is difficult to draw a line between the subspecies and the next lower categories. As a consequence, the proper

[1] Received February 14, 1947.

[2] The term "population" is used throughout this paper in the sense previously defined by me (Copeia 1937 (3): 185). That is, it is a general convenient term used to cover any natural group of individuals of species rank or lower.

taxonomic treatment of *Bathygobius*, the distinction of the populations and their division into species and the minor intraspecific categories, is difficult. On the other hand, an intensive study of progressive stages in the differentiation and ramification of natural populations, which *Bathygobius* affords, from the almost initial to moderately advanced stages, should be of help in throwing light on the species problem and in the speculative contemplation of evolution, more so than the study of speciation in genera in which the species are easily distinguishable.

Bathygobius does not differ from other genera of gobies in showing any special kind of speciation. In other genera, also, it is often found that a section containing two or more species is in an early stage of speciation, and such species, like the species of *Bathygobius*, are difficult to distinguish. *Bathygobius* is exceptional in that all the species, at least the American species, are in an early stage of speciation.

The taxonomic treatment of *Bathygobius* hitherto presented by authors is inadequate, evidently because of the state of speciation existing in this genus and the difficulty of distinguishing the species. The usual descriptive methods used in taxonomic routine are of but little avail for an understanding of the state of speciation in *Bathygobius*. A proper study of variability, by the determination and constructive marshaling of mass numerical data, is indispensable.

There is no general agreement among taxonomists in the treatment of the genus. Without going into a detailed review of the literature, I may state that recently most authors recognize two species on the Atlantic and Pacific coasts of North and South America, including the West Indies, namely, one species, *curaçao*, confined to the western Atlantic and comparatively not common, and another species, *soporator*, common to abundant, and widely distributed on the Atlantic and Pacific coasts. However, *curaçao* is not recognized by all authors. Furthermore, some authors treat the common American populations which are designated *soporator* by most other authors, as belonging to one supposedly circumglobal species, *Bathygobius fuscus*. My detailed study of the genus shows that existing published ideas regarding species distinction in *Bathygobius* are either untenable or represent only a small part of the story, as the following pages will unfold.

As a result of this study four names that have generally been placed in the synonymy because the original authors failed to elaborate the real distinguishing characters of their species, namely, *arundelii*, *catulus*, *lineatus*, and *andrei*, are resurrected and applied to their respective populations.

In this preliminary paper it is possible to give only a very sketchy, skeletonized outline of the richness and diversity of differentiation among the American populations of *Bathygobius*. Moreover, a complete study of the genus should include also the numerous populations from Oceania, the eastern Atlantic, the Red Sea, etc. But samples of these extralimital populations are not well represented in American museums.

The given length of specimens refers to the total length, including the caudal fin. Figures for measurements refer to percentages of the standard length. They are abstracted from my manuscript tables and are given to the nearest whole or half number as in those tables. Except as otherwise indicated, measurements, including the mode where stated, are based on the combined data, irrespective of size and sex. When the measurements are segregated by size and sex (as in the manuscript tables), the averages, the ranges or the modes differ by these groupings in most cases; but these details are omitted for the present.

Incidental to the chief aim, as stated above, a secondary object of this paper is to demonstrate the use of a modification in the conventional system of zoological nomenclature, for species and their subdivisions, where such subdivision is taken cognizance of by the formal establishment of scientific names. This modification has been proposed by me in a previous publication (Zoologica **23**: 282–284. 1938). The present paper demonstrates how the proposed modification works in actual practice. The main headings for the subspecies are trinomials in compliance with the international code. The proposed modification is used as subheadings and in the discussions.

Discontent with the conventional system of nomenclature, or widespread current usage, especially for categories below that of species, has been evinced by biologists. This discontent rests on a more fundamental basis than the mere desire for change. Ideas referring to the basic species concept have been undergoing developmental changes, which have been especially rapid in recent years. The inevitable next step then, in discussing species, was to seek for a modification in zoological nomenclature which, in part, constitutes the language that expresses our ideas of the species concept. That is to say, there is a desire for a change in language in order to express more nearly our changed ideas.

Another cause of dissatisfaction is the use of quadrinomials, which in itself is a modification or extension of the existing international code. Quadrinomials smack too much of the pre-Linnaean polynomial system, in form though not in theory. Moreover, natural populations of species rank and lower, form, in miniature, a hierarchy of categories with a gradually decreasing magnitude of divergence, and there is no inherent reason to stop at quadrinomials. Some authors might propose to use quinquenomials or even sexinomials.

Still another urge for change is motivated by the desire for simplicity in nomenclature.

It is not my aim to give a comprehensive review and discussion of the various proposals that have been made for the modification of zoological nomenclature. A view that seems to have a considerable number of adherents has been expressed by Professor Needham (Science **71**: 26–28. 1930), namely, that if a population has reached a sufficient degree of divergence, as compared with immediately related populations, to be worth naming at all a binomial designation is enough. Reference to this proposition is also made by Professor Cole (Science **93**: 317. 1941). According to this view a name is primarily a handle, a convenient tool for its use in research and discussion of a given entity, which, after all, is the chief function of a name. As a tool, simplicity in nomenclature is desirable.

An argument often introduced for the use of trinomials and quadrinomials is that they also show relationship. However, it is not the function of nomenclature to show relationship. The system of nomenclature now in use does not show relationship at the species level and above (except in showing the generic affiliation of the species); it is not possible to devise a simple system that will do so. Moreover, the indication of relationship by a trinomial is limited; it does not show the relationship of the subspecies, of any one species, to one another. This argument also is not altogether applicable to borderline populations. A given borderline population may be treated by one author as a subspecies with the use of a trinomial and an indication, in a limited way, of relationship; while another author may treat the same population as a full species with the use of a binomial and no indication of relationship. Yet both hypothetical authors treat of the same entity. (It is safe to predict that the number of borderline cases will increase as taxonomists determine more and more the variability and morphologic ranges of the species they now recognize.) Also, suppose two of the intraspecific populations of a given species are near the borderline between subspecies and the next lower category (which I proposed to call "race" in the 1938 paper cited above). One author then may treat them as subspecies and use a trinomial without an indication of their near relationship, as compared with the other coordinate subspecies; while another author may treat them as races and use quadrinomials which would show their close relationship. (Theoretically, the same reasoning applies to quadrinomials and the next lower step in the hierarchy.) Finally, ideas of relationship change with increased knowledge, while nomenclature, to fulfill efficiently its chief function as a tool, should be fixed. To tie up nomenclature with ideas of relationship current for a time, as it is done by the use of trinomials, will lead, perhaps often, to changes of combinations of names.

The modification proposed by me and here demonstrated constitutes a sort of a synthesis of the method in current use and the view stated above which holds that all names should be binomial. The names used in my modification are universally binomial, and when a species is formally split up into subspecies, a numeral subscript is added to indicate the taxonomic category of the population named. It is reasonable to expect that some changes in the prevailing system of zoological nomenclature will be gradually evolved and generally adopted some day. My suggested modification is here introduced, because *Bathygobius* constitutes a favorable example to demonstrate it. The suggested modification is presented for the consideration of biologists and to obtain their reaction. Perhaps it will form a basis for discussion. It is hoped that at least it will be found useful as supplementary to the conventional system for the sake of brevity in discussion.

Bathygobius curaçao (Metzlaar), **sensu lato**
Bathygobius curaçao$_1$ (Metzlaar)

Scales 31–36, present or absent on side of head. Pectoral rays usually 16–17, infrequently 15 or 18; upper 3 or 4 rays modified, their branching very sparse, nearly always forking once. Maxillary 11.5–13.5.

This species is synpatric[3] with *soporator*$_1$ (except *catulus*$_2$) and *mystacium*. It differs from *soporator*$_1$ chiefly in having a smaller number of scales and pectoral rays and fewer modified rays. From *mystacium* it differs mainly in having fewer pectoral rays and a longer maxillary. The samples examined by me are divisible into two subspecies as follows:

Bathygobius curaçao lepidopoma, n. subsp.
Bathygobius lepidopoma$_2$, n. subsp.

Opercle with a patch of 1–8 scales at upper anterior corner; a patch of scales on cheek in the majority of specimens (in about two-thirds). Pectoral 23–26.

Holotype: U.S.N.M. no. 57452. Newfound Bay, Fla.; male 55 mm.

A composite sample of 10 other specimens 31–55 mm examined from Newfound Harbor, Broad Creek, Boca Chica, and Key West; all localities in southern Florida.

This subspecies differs from *curaçao*$_2$ chiefly in the scalation on the side of the head. They differ in a lesser degree in some proportional measurements. Typical specimens have a distinctive physiognomy. On the whole, the difference between *curaçao*$_2$ and *lepidopoma*$_2$ is greater than the usual difference between two coordinate subspecies. It is rather near the borderline between species and subspecies, and it would not be far fetched to treat them as two allopatric species. *B. lepidopoma*$_2$ evidently has a very restricted distribution, being confined to Key West and the very closely adjacent keys where it replaces *curaçao*$_2$. Samples from Tortugas agree more nearly with *curaçao*$_2$ from the West Indies and Panama and are grouped with that subspecies.

Bathygobius curaçao curaçao (Metzlaar)
Bathygobius curaçao$_2$ (Metzlaar)

Gobius curaçao Metzlaar, Rap. Vissch. Kolonie Curaçao, edit. by J. Boeke, **2**: 136. 1919 (Curaçao; Bonaire).

Opercle usually without scales, variants sometimes having one or two scales; infrequently 2–3 scales on cheek. Pectoral 25–28.

A composite sample of 25 specimens 23–62 mm examined from Tortugas, Florida; Bermuda; Haiti; St. Thomas, Virgin Islands; Curaçao; Colon and Porto Bello, Panama.

Bathygobius mystacium, n. sp.

Scales 34–36, none on side of head. Pectoral rays 19–20; upper 4 or 5 modified, their branching sparse, usually forking once. Maxillary 9.5–11.5.

Holotype: U.S.N.M. no. 119895. Nassau, Bahamas; male 57 mm.

A composite sample of 8 other specimens 31–57 mm examined from Nassau, Bahamas; Cuba; Old Providence Island; Colon, Panama.

This species is synpatric with *curaçao*$_2$, *soporator*$_2$, and *longiceps*$_2$. Some specimens were found mixed in the same containers with *soporator*$_2$, and they evidently occur together. It differs from *soporator*$_1$ in having fewer scales and from *curaçao*$_1$ in having more pectoral

[3] This apt term, effectively used by Mayr in a recent book, *Taxonomy and the origin of species*, which treats mainly of some aspects of tendencies and trends in ornithologic taxonomy, should prove useful for brevity and in clarifying taxonomic discussions in general, and deserves a wider application. Two populations are synpatric when their geographic ranges coincide or overlap; they are allopatric when they occupy separate territories. It so happens that closely related populations of a lower rank than full species are, as a rule, allopatric. This is a universal fact of biology and applies to fishes as well as to birds and other groups. Bearing this in mind should help to preclude fallacious interpretation of taxonomic data in ichthyology as well.

rays. It differs from both in having a shorter maxillary. It intergrades slightly with *curaçao*$_1$ in the latter character, but not with *soporator*$_1$ when the data are segregated by size.

Bathygobius arundelii (Garman)

Gobius arundelii Garman, Proc. New England Zool. Club 1: 63. 1899 (Clipperton Island).

Scales 37; present on opercle in a small patch; a few also present on cheek. Pectoral rays 19 (probably only upper 3 modified and forking only once, the fin partly broken in the single specimen examined). Caudal 34 (the combined range of several hundred specimens of all other American species 23–33).

Only the type specimen of this species was examined. It is difficult to discuss the relationship of any one species of *Bathygobius* on the basis of a single specimen, because all the species are so near one another morphologically. For instance, the scale count of this specimen is at the borderline of the separation of two groups of species, and to have an adequate picture of the position of *arundelii* it is necessary to determine the frequency distribution of its scale count. However, after determining the morphological ranges of the other species on the basis of more or less adequate samples, it becomes clear that the single type specimen represents a species, *arundelii*, which is different than all other American species. It differs from *mystacium*, *soporator*$_1$, *ramosus*$_1$, and *lineatus*$_1$ in having scales on the side of the head. It differs from *curaçao*$_1$ in having more, and from *andrei*$_1$ in having fewer pectoral rays. It apparently differs further from *andrei*$_1$ in having fewer modified rays. It seems to differ from all American species in having a longer caudal. It is quite likely an insular species confined to Clipperton Island.

Bathygobius soporator (Cuvier and Valenciennes), sensu lato
Bathygobius soporator$_1$ (Cuvier and Valenciennes)

Scales 37–42, absent on side of head. Pectoral rays 17–22; upper 4–6 rays modified, their extent of branching moderate, the upper three usually forking but once. Ventral (measurement of longest rays from their point of articulation) 20–26 in 91 per cent of specimens, lower limit of range 18. Posterior dorsal rays of large male prolonged, reaching end of hypural or a little beyond. Color pattern very variable and its norm differing also with the local population; a rather diffuse, incomplete and irregular cross-banded pattern; or superimposed on cross-banded pattern, partly or almost wholly replacing it, a 2-rowed spotted pattern on lower half of body, two longitudinal rows of spots, one row of about 9 spots running full length of body directly below the midline, and a shorter row under anterior part of upper row. Maxillary 11.5–16.5.

This species is nearest morphologically to *mystacium*, *lineatus*$_1$, and *ramosus*$_1$ and the differences between *soporator*$_1$ and those three species are discussed briefly under their accounts.

This species is markedly heterogeneous. Moreover, morphologic divergence of the different populations is correlated with geographic distribution only in a very general way; the two do not always coincide. Hence, it is difficult to draw a line between the subspecies and the next lower category or race. On the basis of the samples examined, considering morphology as the primary and geography as a secondary factor in reaching conclusions, the species is divided into four subspecies. As here constituted, *catulus*$_2$ and *soporator*$_2$ are more heterogeneous than the other two, *soporator*$_2$ especially so. Some of the populations grouped under *soporator*$_2$, perhaps also some placed under *catulus*$_2$, might be raised to subspecies rank after a study of more extensive samples.

Bathygobius soporator catulus (Girard)
Bathygobius catulus$_2$ (Girard)

Gobius catulus Girard, Proc. Acad. Nat. Sci. Philadelphia 1858: 169 (St. Joseph Island, Tex.).

Head modally 31, varying 29–33. Caudal 25–28 in 90 per cent of specimens, varying 24–30. Eye 6.5–8.0 in specimen 61–80 mm. Postorbital 15–18. Pectoral rays 17–20; the number of modified rays usually 4. Color pattern of the cross-banded phase; on lower half of body pigment sometimes diffusely separated, presenting a rather faint suggestion of the two-rowed spotted pattern, especially in small specimens.

A composite sample of 70 specimens 20–126 mm, examined from the East and Gulf coasts of the United States ranging from Pilot Town to New Smyrna, Fla., and from Indian Key (at Ten Thousand Islands), Fla., to Corpus Christi Pass, Tex. A small composite sample from the southernmost Florida Keys is tentatively included below under *soporator*$_2$.

This subspecies is characterized by averaging a short caudal, small eye and a low pectoral count, besides other differences, as compared with the other populations of *soporator*$_1$.

Bathygobius soporator soporator (Cuvier and Valenciennes)
Bathygobius soporator$_2$ (Cuvier and Valenciennes)

Gobius soporator Cuvier and Valenciennes, Hist. Nat. Poiss. **12**: 56. 1837 (Martinique; Cuba).

Head usually 30–32, varying 28–34. Caudal 26–30 in 90 per cent of specimens, varying 25–33. Eye 6.5–9.5 in specimens 61–80 mm. Postorbital 15–18. Antedorsal 34–42. Maxillary modally 13.5 or 14.5, depending on the population. Pectoral rays 18–21 with the mode at 19 or 20 depending on the population; number of modified rays usually 5; fourth modified ray (from top) forking more than once in about 50 per cent of specimens of most populations. The 2-rowed, spotted pattern rather well-defined in most populations; while in some others the cross-banded or an intermediate pattern is common.

A composite sample of 200 specimens 14–122 mm examined. Composite samples of 12 specimens or more were examined from the Bahamas, Cuba, Santo Domingo, Puerto Rico and Brazil. Smaller samples examined from Martinique (one of the type localities) and Cozumel Island, Mexico, are grouped with this subspecies. Samples of 1–6 specimens examined from localities in between those mentioned are also included, except a large sample from Panama, which is next described as a distinct subspecies. A small composite sample of 16 specimens 39–112 mm from the southernmost Florida Keys, namely, Lower Matecumbe Key, Key West, and Tortugas, is not decisive, but is perhaps slightly nearer *soporator*$_2$ than *catulus*$_2$ and is tentatively grouped with this subspecies.

Bathygobius soporator longiceps, n. subsp.
Bathygobius longiceps$_2$, n. subsp.

Head modally 32, varying 29–34. Caudal 26–29 in 90 per cent of specimens, varying 25–30. Eye 7–9 in specimens 61–80 mm. Postorbital 15–20. Antedorsal 36–43. Maxillary modally 14.5. Pectoral rays 18–21 with the mode at 19; the number of modified rays usually 5; the fourth modified ray forking once in about 80 per cent of specimens. Color pattern variable; cross-banded, two-row spotted, or intermediate.

Holotype: U.S.N.M. no. 119896. Porto Bello, Panama; male 108 mm.

A composite sample of 90 other specimens 17–88 mm examined from various localities on the Atlantic coast of Panama and the Canal Zone.

The Panama population is separated as a distinct subspecies from the other populations of *soporator*$_2$ largely on the basis of a combination of characters. It has a comparatively long head, postorbital, antedorsal and maxillary, a comparatively low pectoral count and sparse extent of branching of the modified pectoral rays. These characters are nearly duplicated in one or another of the populations of the heterogeneous *soporator*$_2$; but in the Panama population they occur together, and for this reason it is deemed appropriate to set it aside as a distinct subspecies, *longiceps*$_2$.

Bathygobius sporator sextaneus, n. subsp.
Bathygobius sextaneus$_2$, n. subsp.

Head 28–32. Caudal 26–32. Eye 7–9 in specimens 65–80 mm. Postorbital 14–16. Antedorsal 35–38. Maxillary 12.5–14.5. Pectoral rays 19–22 with the mode at 20; the number of modified rays usually 6. Two-rowed, spotted color pattern usually rather well defined.

Holotype: U.S.N.M. no. 21231. Bermuda; female 103 mm.

A composite sample of 18 other specimens 44–113 mm examined from Bermuda.

This subspecies differs from the others in usually having 6 modified rays and averaging a higher pectoral count. The sixth ray of *sextaneus*$_2$ resembles in structure the fifth ray (or the fourth) of the other subspecies. The postorbital part of the head especially, and also the head, antedorsal distance and maxillary are short.

Bathygobius lineatus (Jenyns), **sensu lato**
Bathygobius lineatus$_1$ (Jenyns)

Scales 38–42, none on side of head. Pectoral rays 19–22; usually upper 5 rays modified, their extent of branching rather sparse, the upper 3 usually forking once. Large male with the posterior dorsal rays not notably prolonged, not reaching end of hypural.

This species is divisible into two subspecies, *lineatus*$_2$ in the Galápagos Islands and *lupinus*$_2$

from Lobos de Afuera Island, off the coast of Peru.

B. lineatus$_1$ is another borderline population morphologically. It is very close to *soporator*$_1$, and its two subspecies might within reason be placed as subspecies of *soporator*$_1$. It differs from *soporator*$_1$ chiefly in the relative length of the posterior dorsal rays of the large male. But even this character is not pronounced, and moreover, it differs to a moderate extent also intraspecifically with the local populations. However, because of the absolute geographic separation of *lineatus*$_1$ and *soporator*$_1$ and for convenience, it is deemed best to treat them as two full species based on this one rather slight and variable difference. As the species of *Bathygobius*, in general, have not yet diverged to a high degree, this small difference perhaps takes on added significance.

Bathygobius lineatus lineatus (Jenyns)
Bathygobius lineatus$_2$ (Jenyns)

Gobius lineatus Jenyns, Zool. Voy. *Beagle* 4: 95, pl. 19, fig. 2. 1842 (Galápagos).

Depth of caudal peduncle 11.5–14.5. Head 29–34. Postorbital 14–18. Antedorsal 35–41. Maxillary 12.5–15.5 in specimens 56–94 mm. Pectoral rays 19–22, with the mode at 20.

Of this subspecies 70 specimens 17–94 mm were examined from James, Chatham, Charles, Bartholomieu, and Narborough Islands. It is evidently an insular subspecies of the Galápagos Archipelago.

Bathygobius lineatus lupinus, n. subsp.
Bathygobius lupinus$_2$, n. subsp.

Depth of caudal peduncle 14.5–15.5. Head 29–30. Postorbital 14–15. Antedorsal 35–37. Maxillary 12.5–14.5 in specimens 66–123 mm. Pectoral rays 19–20.

Holotype: U.S.N.M. no. 77510. Lobos de Afuera, Peru; male 123 mm.

Two other males 66–85 mm examined from the same place.

This subspecies differs from *lineatus*$_2$ in averaging a deeper peduncle and a shorter head, postorbital, antedorsal and maxillary. It attains to a larger size. While ordinarily it is a risky business to establish a new subspecies on the basis of only 3 specimens, yet, after comparing the measurements of these specimens with the frequency distribution of *lineatus*$_2$, and other species and subspecies of *Bathygobius*, I am confident that an examination of an adequate sample from Peru will confirm the conclusion that that population is subspecifically distinct from that of the Galápagos.

Bathygobius ramosus, n. sp., **sensu lato**
Bathygobius ramosus$_1$, n. sp.

Scales 36–43, none on side of head. Pectoral rays 17–21; usually the upper 5 modified, profusely branched, the second and third (from top) usually forking twice or three times. Ventral 15–19 in 88 per cent of the specimens, the upper limit of the range 22. Usually a single longitudinal row of about 9 spots nearly median in position; the spots, or a variable number of them, usually partly or almost wholly split up into 2 or 3 parts, presenting gross appearance of a series of more numerous and smaller spots than in *soporator*$_1$; cross-banded pattern absent or present on upper half of side only.

This is the commonest and most widespread species of *Bathygobius* on the Pacific coast of the American continents. All authors combined *ramosus*$_1$ with the common Atlantic *soporator*$_1$ under one heading. However, *ramosus*$_1$ differs from *soporator*$_1$ in having a shorter ventral, the modified pectoral rays branch more profusely and the color pattern is usually distinctive. Having examined in detail over 600 specimens of both species, I can safely make the statement that after one becomes familiar with their distinguishing characters and then attempts to identify single specimens, from the opposite coasts of Panama, without a knowledge of the locality of capture, he should make a correct identification in 95 or more trials out of 100. The large majority of specimens of *ramosus*$_1$ may be placed at a glance by distinctive color alone. This is about as good or better than is possible to do with many other closely related species which are generally recognized by authors.

The extent of branching of the modified pectoral rays varies greatly with the individual and each ray varies independently and in this preliminary paper the statements in the diagnoses of the two species give only a part of the picture of this difference.

The samples examined of *ramosus*$_1$ indicate that it is divisible in at least 4 subspecies, as follows:

Bathygobius ramosus curticeps, n. subsp.
Bathygobius curticeps$_2$, n. subsp.

Pectoral rays modally 20, varying 19–21.

Scales modally 39, varying 38–42 (infrequently 42). Head usually 29–30, varying 28–32. Caudal 25–31. Eye 7.5–9.0 in specimens 46–60 mm.

Holotype: U.S.N.M. no. 30739. Cape San Lucas, Mexico; male 98 mm.

A composite sample of 50 other specimens 23–92 mm examined from Cape San Lucas, Mazatlán, and Tres Marías Islands, all localities on the Pacific coast of Mexico. A small composite sample of 16 specimens 19–86 mm from Ecuador and Colombia agrees most nearly with *curticeps*$_2$ and is tentatively grouped with it.

This subspecies differs from *ramosus*$_2$ chiefly in having a shorter head and also in having a shorter postorbital, antedorsal and maxillary, and a somewhat less profuse branching of the modified pectoral rays.

Bathygobius ramosus ramosus, n. subsp.
Bathygobius ramosus$_2$, n. subsp.

Pectoral rays modally 20, varying 18–21 (infrequently 18). Scales modally 39, nearly always 37–41, rarely 36 or 42. Head usually 31–32, varying 29–33. Caudal 24–30. Eye 7.0–10.0 in specimens 46–60 mm.

Holotype: U.S.N.M. no. 119897. Balboa, Panama; male 87 mm.

A composite sample of 150 other specimens 21–101 mm examined in detail from various localities on the Pacific coast of Panama and the Canal Zone.

This subspecies is probably nearest *curticeps*$_2$ and their differences are stated above.

Bathygobius ramosus micromma, n. subsp.
Bathygobius micromma$_2$, n. subsp.

Pectoral rays usually 20, often 19. Scales 40–43. Head modally 29, varying 28–30. Caudal 26–28. Eye 6.5–7.5 in specimens 50–60 mm.

Holotype: U.S.N.M. no. 53504. Paita, Peru; male 61 mm.

Other 10 specimens 50–72 mm from same locality examined.

This subspecies averages the smallest eye and the highest scale count as compared with all other three subspecies. The head length is nearest to that of *curticeps*$_2$ (averaging somewhat shorter than in that subspecies even), and on the whole, it is nearest morphologically to *curticeps*$_2$.

Bathygobius ramosus longipinnis, n. subsp.
Bathygobius longipinnis$_2$, n. subsp.

Pectoral rays modally 19, varying 17–20. Scales 38–41. Head modally 30, varying 28–32. Caudal 27–33. Eye 7.5–9.5 in specimens 46–56 mm.

Holotype: U.S.N.M. no. 119898. Socorro Island, Revillagigedo Archipelago; male 78 mm.

A composite sample of 25 other specimens 15–90 mm examined from same island.

This is evidently an insular subspecies inhabiting Socorro Island (perhaps also the other islands in the Revillagigedo Archipelago). It differs from the other three subspecies in having a lower pectoral count and a longer caudal. The other fins also average somewhat longer but the divergence is not as marked. On the whole, *longipinnis*$_2$ diverges from the three mainland species to a greater extent than the latter diverge from one another. Its divergence is not far from the borderline of species and subspecies.

Bathygobius andrei (Sauvage), **sensu lato**
Bathygobius andrei$_1$ (Sauvage)

Scales 37–42, present or absent on side of head. Pectoral rays usually 21–22, varying 20–23; usually upper 5 rays modified, moderately branched, the upper three usually forking once. An incomplete and diffuse cross-banded color pattern.

This species is divisible into two synpatric subspecies, the distributional basis of their separation probably being water depth as indicated below, that is, they are apparently two synpatric ecological subspecies.

One subspecies, *andrei*$_2$, is readily separated from *ramosus*$_1$, *soporator*$_1$, and *lineatus*$_1$ by having scales on the side of the head; but this does not always hold for the other subspecies. This species is further separable from *ramosus*$_1$, with which it is synpatric, by the extent of branching of the modified pectoral rays and the color pattern. The frequency distribution of the pectoral count is decidedly different in *andrei*$_1$ than in all other American species, but there is some overlapping in that character.

There is a shade of doubt in my mind whether the name *andrei*, which has been generally relegated to the synonymy, is properly applicable to the species here distinguished. Sauvage's original description is largely generic.

Moreover, that author states "tête entièrement nue," which does not apply to the main character that distinguishes our *andrei*$_2$. My reliance for the present use of the name *andrei* is based on the locality (Ecuador) and size (160 mm) given in the original description. According to my rather extensive samples that size is applicable only to that American population here designated *andrei*$_2$. I assume that Sauvage overlooked the patch of scales on the opercle.

Bathygobius andrei andrei (Sauvage)
Bathygobius andrei$_2$ (Sauvage)

Gobius andrei Sauvage, Bull. Soc. Philomatique (7) 4: 44. 1880 (Guayas, Ecuador; in brackish water).

Scales 37–41; a rather large or moderate patch of scales on opercle; scales on cheek present or absent. Pectoral 22–29. Caudal 25–32. Head 30–35. Depth of peduncle 12.5–15.5.

A composite sample of 45 specimens 21–198 mm examined from the Pacific coast, ranging from Barranca, Costa Rica, to Guayaquil, Ecuador, and including Panama.

This is apparently a typical tide-pool population. It occurs together with *ramosus*$_2$ and some of the constituent samples examined were separated from containers which included a mixture of both that is readily separable into their proper species. *B. andrei*$_2$ constitutes a morphologically compact population rather easily separable (in a comparative way) from all American species and subspecies of *Bathygobius*, except *heteropoma*$_2$. The latter introduces a rather discordant element in the easy and orderly taxonomic placement of *andrei*$_2$. The proper distinction of *andrei*$_2$ from the other species is discussed above under *andrei*$_1$, and from *heteropoma*$_2$ under that subspecies below.

Bathygobius andrei heteropoma, n. subsp.
Bathygobius heteropoma$_2$, n. subsp.

Scales 40–42; absent on side of head, or when present, varying from a single scale to a small patch on opercle (smaller than in *andrei*$_2$). Pectoral 20–23. Caudal 23–28. Head 30–32. Depth of peduncle 14.5–15.5.

Holotype: U.S.N.M. no. 119894. Chame Point, Panama; male 101 mm; Robert Tweedlie.

A composite sample of 8 other specimens 47–115 mm examined from the same locality by the same collector.

Robert Tweedlie's collecting methods have been described by Meek and Hildebrand (Publ. Field Mus. Nat. Hist. **15** (1): 6. 1923), and it seems very probable that the specimens examined belong to a population that lives at a moderate distance offshore, while *andrei*$_2$ is a typical shore and tide-pool subspecies.

This subspecies differs from *andrei*$_2$ in lacking scales on side of the head, or when present they are in sparser numbers. (One is tempted to say that *heteropoma*$_2$ is on the way to losing the scalation on the side of the head because of its changed habitat.) The frequency distribution of the scale count will perhaps prove to differ in the two subspecies on further sampling. The caudal, head, postorbital, and antedorsal of *heteropoma*$_2$ seem to average shorter and the peduncle deeper than in *andrei*$_2$. The pectoral averages considerably shorter in *heteropoma*$_2$ than in *andrei*$_2$ and all other American species and subspecies of *Bathygobius*. Considering all differences, it may perhaps be stated that *heteropoma*$_2$ is not far from the borderline between species and subspecies.

KEY TO THE AMERICAN SPECIES AND SUBSPECIES OF *BATHYGOBIUS*[4]

a. Scales 31–36. Western Atlantic.
- *b*. Pectoral rays 15–18 .... *curaçao*$_1$
  - *c*. A patch of scales present on opercle. Key West and very closely adjacent keys.... *lepidopoma*$_2$
  - *cc*. Scales usually absent on opercle. Tortugas, Florida; West Indies; Panama.......... *curaçao*$_2$
- *bb*. Pectoral rays 19–20. West Indies; Panama.......... *mystacium*

aa. Scales 36–43.
- *d*. Pectoral rays 17–22, the mode at 18, 19, and 20, depending on the population.
  - *e*. Scales present on side of head; caudal 34. Clipperton Island.......... *arundelii*
  - *ee*. Scales absent on side of head; caudal 23–33.
    - *f*. Upper three modified pectoral rays usually forking once; ventral 18–26.
      - *g*. Posterior dorsal rays of large male more or less prolonged, reaching end of hypural or a little beyond. Western Atlantic.......... *soporator*$_1$
        - *h*. Modified pectoral rays usually 4 or 5.

[4] Footnote 4 at end of key (p. 284).

i. Caudal short and eye small. Florida to Texas, except southernmost Florida Keys. *catulus*$_2$

ii. Caudal longer and eye larger.

j. Head, postorbital, antedorsal, and maxillary long; pectoral count comparatively low; branching of modified rays sparse. Panama. *longiceps*$_2$

jj. Characters differing with the local population, but not occurring in preceding combination. Southernmost Florida keys to Brazil and the West Indies, excepting Panama. . . . . *soporator*$_2$

hh. Modified pectoral rays usually 6. Bermuda. . . . . *sextaneus*$_2$

gg. Posterior dorsal rays of large male not markedly prolonged, not reaching end of hypural. Eastern Pacific. . . . . *lineatus*$_1$

k. Depth of caudal peduncle 11.5–14.5; maximum length 94 mm. Galápagos Archipelago. *lineatus*$_2$

kk. Depth of caudal peduncle 14.5–15.5; maximum length 123 mm. Lobos de Afuera Island, Peru. . . . . *lupinus*$_2$

ff. Second and third modified pectoral rays usually forking more than once; ventral 15–22. Eastern Pacific. . . . . *ramosus*$_1$

l. Pectoral rays modally 20.

m. Eye not small; scales 36–42.

n. Head usually 29–30. Coasts of Mexico, Colombia, and Ecuador. . . . . *curticeps*$_2$

nn. Head usually 31–32. Panama. . . . . *ramosus*$_2$

mm. Eye small; scales 40–43. Paita, Peru. . . . . *micromma*$_2$

ll. Pectoral rays modally 19. Socorro Island. . . . . *longipinnis*$_2$

dd. Pectoral rays usually 21–22, varying 20–23. Eastern Pacific. . . . . *andrei*$_1$

o. Scales on opercle in a rather large or medium sized patch; pectoral 22–29. Costa Rica to Ecuador, including Panama, inshore. . . . . *andrei*$_2$

oo. Scales on opercle in a small patch or absent; pectoral 20–23. Panama, offshore. . . . . *heteropoma*$_2$

[4] I present this key here, in conjunction with the present short résumé, with some measure of reluctance, rather in deference to the opinion of many taxonomists who seem to regard a key as indispensable. In general, a key is, of course, a useful tool in taxonomic practice, when based on carefully tested data instead of being merely compiled from the literature. Even so, there are many exceptions, where the brief and categorical statements used in a key, without numerous qualifying phrases, and without reference to the full data in the text on which conclusions are based, may be somewhat misleading, and *Bathygobius* is such an exception. In such cases the key best finds its place in a publication presenting the full details of the study, reenforced by tables, instead of in a short, condensed, skeletonized, preliminary paper, such as this one. While this key gives a bird's-eye general view of the characters that separate, and the relationship between, the species and subspecies, the student should not assume that it constitutes an easy shortcut to enable him always to "run down" specimens correctly.

ZOOLOGY.—*Notes on some Mexican urocoptid mollusks, with the description of new species.*[1] PAUL BARTSCH, U. S. National Museum.

The U. S. National Museum recently received several sendings of mollusks from Mexico from that indefatigable collector, Miss Marie E. Bourgeois. Among other things these include fine lots of members belonging to the family Urocoptidae. Some of them have required considerable research to untangle the confused nomenclature, while others prove to belong to undescribed species. It is hoped that this little paper will prove helpful and stimulate our Mexican friends to further efforts in this field.

Genus **Anisospira** Strebel

Anisospira? martensii (Strebel)

1865. *Cylindrella* (*Urocoptis*) *truncata* von Martens, Malakoz. Blätt. **12**: 13–14, in part.

1880. *Eucalodium martensi* Strebel, Beitr. Kenntn. Fauna Mex. Land- und Süsswasser Conch. **4**: 73–74, in part; pl. 13, fig. 13; pl. 11, figs. 8, 14; pl. 12, fig. 3.

1897. *Eucalodium truncatum* von Martens, Biologia Centrali-Americana: 264, in part.

Shell decollated, turrited, solid, dusky olivaceous, somewhat paler at the suture; whorls remaining 7, scarcely convex, increasing regularly arcuately striate, with 3 or 4 slightly elevated, irregular spiral lines. Last whorl not solute, rounded, with an obsolete basal carina. Aperture subdiagonal, subcircular, posterior angle rounded, separated a little from the penultimate whorl. Columellar fold obsolete. Peristome somewhat thickened and slightly expanded. Length, 29.5 mm; diameter, 10 mm; aperture length, 7 mm; diameter, 6 mm.

[1] Received March 5, 1947.