NEW BERMUDA FISH,
INCLUDING SIX NEW SPECIES AND FORTY-THREE
SPECIES HITHERTO UNRECORDED FROM BERMUDA

BY WILLIAM BEEBE AND
JOHN TEE-VAN

During the three seasons’ work (1929, 1930 and 1931) of the Department of Tropical Research of the New York Zoological Society at Nonsuch Island, Bermuda, the following species of apparently undescribed shore fish were taken, all within a radius of two miles of the island. The type specimens are in the collections of the Department of Tropical Research. Illustrations of these forms will be given in forthcoming publications on the fishes of Bermuda.

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* Contribution, Department of Tropical Research, New York Zoological Society, No. 368.

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Quassiremus goslingi sp. nov.

Type: No. 8700, Bermuda Oceanographic Expedition, New York Zoological Society, Captured with hand line at 30 feet depth, Castle Roads, Bermuda, March 21, 1929, Length 652 mm.; Paratypes: 2 specimens, Nos. 25,150, (623 mm.) and 25,151 (710 mm.), captured at same time and place.

Field Characters: Elongate, cylindrical, firmly-built eels with tip of tail forming a hard point, the dorsal and anal fins ending before the tail tip; pectoral fins rudimentary, visible as a minute flap immediately back of the gill-opening. Brownish with conspicuous dark brown, orange and red spots, pale below.

Measurements and Counts: (Type) Length 652 mm.; trunk plus head 361 (1.8 in length); trunk 304 (2.14 in length); tail 291 (2.2 in length); depth 24 (27 in length); width of body 23.5 (27.7 in length); snout to dorsal fin 74.5 (8.7 in length); head 57 (11.4 in length); eye 5.6 (10 in head); interorbital 7.8 (7.3 in head); snout 12.5 (4.5 in head); snout to gape 21 (2.7 in head); width at gape 13 (4.38 in head); pectoral length 1 (57 in head); length of pectoral base 3.8 (15 in head); gill-opening 6 (9.5 in head).

Description: Body elongate, cylindrical, flattened slightly on the ventral surfaces, the tail tapering from the anus to its tip, ending in a stiff hard point. Depth and width of body almost equal, the depth of the body 2.25 to 2.5 in the head.

Lateral line beginning on the head above the gill-opening, continued along the middle of the sides, consisting of approximately 125 well-marked pores.

Head tapering anteriorly, the sides flattened, the region of the gill-covers somewhat swollen. Snout tapering, its dorsal view abruptly rounded anteriorly, the snout extending about one-half an eye’s diameter beyond the tip of the lower jaw.

Eye 10 to 11.3 in the head, 2.3 to 2.5 in the snout, elliptical, its long axis horizontal, the upper margin reaching the dorsal profile, its outer transparent lid continuous with the skin of the head.

Anterior nostril in a short, downward-pointing tube not quite at the tip of the snout. Posterior nostril aperture almost as large as the anterior, rounded, situated within the upper lip just below the anterior end of the eye, concealed by a dermal flap which begins just anterior to the nostril.

Mouth medium in size, the jaws straight and closing completely, the gape extending half an eye’s diameter beyond the eye.
Teeth conical, pointing backward. Two or three large, curved teeth at the anterior part of the jaw, maxillary with 12 to 14 teeth on each side. Mandible with 13 to 14 teeth in a single row on each side. Vomerine teeth in a single row, 14 in number, the anterior 5 much larger than the others.

Gill-openings small, their openings slightly greater than the eye's diameter, situated on the lower sides, almost vertical, the distance between them, ventrally, equal to about twice the length of the slit.

Dorsal fin depressible in a deep groove, its supporting rays rather high, their height more than half the depth of the body. Anal fin similar to the dorsal in height.

Pectoral fins minute, represented by a dermal flap at the upper end of the gill-opening, their base about one half the length of the gill opening.

Color in life: General color of sides above the lateral line salmon-buff, changing abruptly beneath the lateral line to creamy white. Seventeen saddle-like markings of salmon-orange along the dorsal surface, these spots becoming darker centrally, this darkening most pronounced on the three last markings. A series of large light orange spots which shade to deep chrome in the center, on the mid-sides, one between each of the saddle-like markings. Between the upper saddles and the lateral spots are smaller, similarly-colored spots, the majority with dark centers. Snout with a pinkish buff background and with small irregular blackish spots. Back of the eye these spots enlarge and change to antique brown. Iris pale gold with dark markings anteriorly and posteriorly. Lateral line pores white, conspicuous from head to tail. Dorsal fin marked with pale orange spots, somewhat like those on the body, the fin margined with white. Anal fin transparent, with a few orange spots posteriorly.

Discussion: The only previously recorded species of Quassiremus from the Atlantic is Quassiremus productus, described by Seale in 1917 from the Bahama Islands, as the result of a specimen taken in 1861. The present species differs from productus in the following particulars:—smaller mouth, the distance from the snout to gape 2.7 to 3.1 in the head as opposed to 2.3 in productus; the posterior nostril is a rounded hole, not a slit; eye 2.1 to 2.5 in the snout, not 1.7 as in productus; pores of the lateral line prominent; dorsal and anal fins high; somewhat different color pattern.
Name: We take pleasure in naming this remarkable new eel for the Honourable F. Goodwin Gosling, to whom we owe the first suggestion of using Nonsuch as a scientific station, and whose kindness in Bermuda, to visiting scientists, has become proverbial.

Exonautes nonsuchae sp. nov.

Type: No. 9983, Department of Tropical Research, New York Zoological Society, in Sargassum weed near shore of St. David’s Island, Bermuda, May 15, 1929, Standard length 24.5 mm.

Field Characters: Very small, four-winged flyingfish without jaw barbels, and with 13 anal rays. Pinkish above with vertical orange cross-bars on the sides. Tips of pectorals and ventrals bright orange, the base of each fin with a dark black or blue spot. Tips of dorsal and anal fins orange.

Measurements and Counts: Length, total 30.3 mm.; length, standard 24.5 mm.; depth 3.8 (6.4 in length); width of body at gill-openings 3.8; head 5.8 (4.2 in length); eye 2.4 (2.4 in head); interorbital 2.4 (2.4 in head); snout 1.2 (4.8 in head); snout to pectoral origin 5.3; snout to ventral origin 13; snout to dorsal origin 15.5; snout to anal fin 16.5; length dorsal base 5.2; length of longest dorsal ray 4.1; length anal base 4.5; length longest anal ray 3.5; length lower caudal lobe 7.5; dorsal fin 12 rays; anal 13 rays; 49 scales in a lateral series.

Description: Rather elongate, the profile from eye to origin of dorsal fin straight, the anterior portion of the dorsal fin base raised; head from snout to above posterior portion of eye straight, but at a considerable angle from the back; snout short, pointed when viewed either from the side or above; eye large, circular, entering the upper profile; mouth small, oblique; maxillary small, almost vertical, its posterior margin reaching to the anterior margin of the eye.

Dorsal fin high anteriorly, becoming considerably shorter posteriorly; anal fin similar but not as markedly so, the latter fin beginning beneath the 2nd and 3rd dorsal ray. Pectoral fin with 18 rays, the first two parallel and very close together, the anterior slightly shorter than the second and simple, the second ray branched; 6th and 7th rays longest, the 5th and 8th equal in length, the 3rd, 4th and 5th becoming progressively longer in almost equal amounts; the adpressed pectoral fin reaches to next to the last ray of the
dorsal fin. Ventral fins prominent, the tip of the adpressed fin reaching slightly beyond the anal base.

Color: (See Frontispiece of "Nonsuch; Land of Water" for color plate). In life,—general color of body somewhat pinkish with six vertical orange bands on the sides, the posterior one below the posterior tip of the dorsal fin. Posterior portion of caudal peduncle dark blue. Upper parts with small scattered bluish chromatophores. Dorsal fin orange superiorly with a small dusky spot at the tip. Anal fin orange distally, with a blackish tip. Caudal fin colorless. Pectoral fin bluish-black at base, its anterior outer portion bright orange, with scattered black chromatophores along the rays and along the margin of the fin; a small dusky spot in the center of the fin near the orange portion. Ventral fins with a blackish spot at their base, in the center of which is an orange spot; distal ⅔ of ventral fins bright orange with dusky toward the tip of the rays.

In preservative the entire body is dusky blue-gray. Vertical fins slightly dusky, the anterior tip of the dorsal with a dusky patch. Pectorals transparent with the exception of a dusky patch at the base and an irregular patch of dusky along the anterior edges, this patch widest and most prominent at the outer tip of the fin. Ventral fins dusky at base and on outer ⅔ of the fin, the remainder transparent.

Discussion: The present species does not answer the descriptions of any of the Atlantic flyingfishes sufficiently well to assign it to any definite form. Until its relationship to some adult form can be established, it seems best to give the present specimen a new name.

It is of interest that this species, as well as Cypselurus furcatus and other young of Exonautes which live in Sargassum weed, should all possess a broken and mottled wing-pattern.

**Corythoichthys bermudensis** sp. nov.

*Type:* Male, No. 9326, Bermuda Oceanographic Expedition, New York Zoological Society, Nonsuch Island, Bermuda, August 18, 1930, standard length 61 mm.

Field Characters: Small, rather short and robust pipefish with upturned snout and dorsal fin of 23 rays on O body and 7 caudal segments; 17 body and 26 caudal segments; greenish-brown, somewhat mottled and with vertical, irregular lighter patches.
Measurements and Counts: Length, total 64 mm.; length, standard 61 mm.; head and trunk 26.5 mm. (2.3 in length); tail 34.5 (1.77 in length); depth 3.8 (16 in length); head 6.5 (9.4 in length); snout 2.1 (3.1 in head); eye 1.2 (5.4 in head); post-orbital head 3.3 (1.97 in head); snout to origin of dorsal fin 27; pectoral length 1.6; caudal fin length 3; dorsal fin 23 rays on O plus 7 segments; pectoral 11 rays; caudal 9 rays; body segments 17, caudal segments 26.

Description: Snout short, upturned, with a slight median crest which ends between the orbits; after a short space this crest begins again and ends on the nape. A small supra-orbital ridge, and a small but well-developed ridge on the opercle, from which small striations radiate downward and backward. All of these ridges are smooth and not serrated.

Superior trunk crests end just before the posterior end of the dorsal fin; median lateral trunk crest ends on the last body segment, slightly below the middle of the sides, with no indication of any attempt to join the lower body ridges. Superior caudal crest begins on the last body segment, below the superior trunk ridge and roughly paralleling it until the caudal ridge ascends to its position on the caudal portion of the body. Inferior trunk and caudal crests continuous. Dermal appendages not present.

Brood pouch extending on 15 caudal segments, its dermal flaps not meeting on the mid-ventral line.

Color: Body mottled greenish brown, the lower surface of the trunk greenish; dull yellowish, irregularly margined vertical bands on the body and trunk,—about 8 on the trunk, these conspicuous mostly on the dorsal half of the sides, about 9 on the tail, these widest on the upper half of the sides; a series of small brownish spots on the keels of the tail. Upper surface of the head and cheeks greenish brown, the lower surface of the head and snout yellowish. A brown line on the snout from eye to angle of mouth. Dorsal fin with small brown spots on the rays.

Discussion: In Parr's key (1927, p. 30) to western Atlantic Corychoichthys, this species is closest to C. cayorum Evermann and Kendall 1897. It differs from the latter in various counts and proportions, and when compared with the original plate of cayorum, markedly in the lesser size of the head ridges.
Syngnathus pipulus sp. nov.

Type: No. 25,152, Bermuda Oceanographic Expedition, New York Zoological Society, The Reach, Bermuda, October 25, 1931, Standard length 113 mm.

Field Characters: Pipefish with short tail (26 caudal segments); short dorsal fin of 22 rays on 1 body and 4½ caudal segments; yellowish buff mottled with greenish.

Measurements and Counts: Length, total 116.5 mm.; length, standard 113 mm.; head and trunk 52.5 (2.15 in length); tail 60.5 (1.87 in length); depth 5.5 (20.5 in length); head 15.2 (7.4 in length); snout 7.4 (2.05 in head); eye 2.3 (6.6 in head); post-orbital head 6 (2.5 in head); snout to dorsal origin 49.5; pectoral fin length 2.5; caudal length 3.5; body segments 18; caudal segments 26; dorsal fin with 22 rays on 1 body and 4½ caudal segments; pectoral rays 13; caudal rays 7.

Description: Snout rather long with a low serrated ridge extending from about ½ the distance from the snout to the eyes, and ending at the anterior margin of the orbits. A slightly serrated ridge on the nape. Supraorbital ridge extending slightly back of eye.

Superior body ridge ending on the 4th caudal segment. Superior caudal ridge beginning on the last body segment; median lateral body ridge ending on middle of sides of last body segment. Inferior trunk and caudal ridges continuous. Head and body with small dermal tentacles, especially prominent on the body ridges.

Marsupium extending on 20 caudal segments, containing eggs.

Color: (Preserved specimen) General color dull yellowish buff, the sides and upper parts mottled with brownish. Narrow transverse bars of pale dull yellow on the upper surfaces and vertical bars of the same color on the sides,—4 on the body segments and 9 on the caudal. Under surfaces, especially the caudal portion of the body, with transverse brownish-green bands. Snout mottled with brown. Fins colorless.

Eucinostomus mowbrayi sp. nov.

Type: No. 9328, Bermuda Oceanographic Expedition, New York Zoological Society, Nonsuch Island, Bermuda, September 30, 1930, standard length 140 mm.

Field Characters: Small, somewhat elongate, compressed,
bright silvery fishes with extremely protractile mouth parts; third anal spine twice as large in diameter as the second and slightly longer; first anal spine very small.

Measurements and Counts: Length, total 168 mm.; length, standard 140 mm.; depth 47 (2.98 in length); width of body 20 mm.; head 41.5 (3.4 in length); eye 14.2 (2.9 in head); snout 14 (2.96 in head); maxillary 14 (2.96 in head); interorbital 12 (3.46 in head); pectoral fin length 29 (1.4 in head, 4.8 in length); snout to dorsal fin 52; length of interhaemal spine 22; dorsal IX, 10; anal III, 7; gillrakers 7, the lowermost slightly longer than the uppermost; scales, 48 rows, 4½ rows from origin of dorsal fin to lateral line.

Description:—Body elongate, compressed, back moderately elevated; anterior profile slightly convex from snout to occiput, and again slightly convex from occiput to dorsal origin; eye large, the interorbital space slightly convex; maxillary reaching slightly beyond the anterior margin of the eye; premaxillary groove linear, widest anteriorly, not crossed by scales; preorbital and preopercle entire; gill-rakers small, 7 below the angle on the first arch, the lowermost slightly longer than the uppermost; lateral line complete, paralleling the back.

Dorsal spines weak, the fin highest anteriorly, the 2nd and 3rd spines subequal and longest, the spines becoming progressively shorter posteriorly; dorsal rays low; a sheath of scales along the base of both spinous and soft dorsal. Anal fin low; first anal spine very short; third anal spine twice as large in diameter as the second and slightly longer; a broad sheath of scales along the base. Pectoral fin not quite reaching the vent. Ventrals with a large axillary scale, their tips not reaching the vent. Caudal fin deeply forked.

Interhaemal spine similar to illustration given by Parr (1930) of *Eucinostomus havana* (Nichols), the air bladder entering a cup-shaped depression in the lower anterior side of the interhaemal spine.

Color: Silvery, darker above, no traces of cross-bars; a dusky spot at the tip of the anterior rays of the dorsal fin. Fins, except the clear pectorals, slightly dusky.

Discussion: This species is close to *Eucinostomus havana* (Nichols), but differs markedly in the relative sizes of the anal spines.

Name: Named for Mr. Louis L. Mowbray, the capable Director of the Bermuda Aquarium, who has shown us many kindnesses in the course of our work in Bermuda.
Iridio bathyphilus sp. nov.

Type: No. 9050, Bermuda Oceanographic Expedition, New York Zoological Society, taken in trap set in 510 feet water, one mile south of Nonsuch Island, Bermuda, September 30, 1929, standard length 145 mm.; Paratypes,—3 specimens, Nos. 25,045 a, b and c, 123, 121 and 89 mm. respectively, taken at same time and place.

Field Characters: Small, elongate wrasse from deep water with the posterior margin of the caudal fin double-concave. Brilliant in coloration with a band of green or yellow from snout to eye, which bifurcates posterior to eye, the upper bifurcation extending to the nape, the lower continued along the sides as a broken band of yellow, the yellow alternating on two scale rows. A large black or brilliant turquoise-green patch on the upper anterior sides, and sometimes with a small black patch on the body at the base of the middle caudal rays.

Measurements and Counts: length, total 165 mm.; length, standard 145 mm.; depth 34 (4.25 in length); width of body 16 (9 in length); Snout to dorsal fin 37 (3.9 in length); snout to anal fin 72 (2 in length); head, to tip of opercular flap 43.5 (3.3 in length); eye 7.2 (6 in head); interorbital space 9 (4.8 in head); snout 14.5 (3 in head); snout to gape 10.5 (4.15 in head); caudal peduncle height 16.3 (2.75 in head); dorsal fin rays IX, 11; anal fin rays III, 12; pectoral fin rays 13; length upper margin of pectoral fin 23.5; length lower margin of pectoral 10.2; ventral fin rays I, 5; length of ventral fin 21.5; length inner margin of ventral fin 10.7; scales, from upper angle of gill opening 28 to 29; gill-rakers 11 on lower half of the anterior arch.

Description: Body elongate, compressed, the caudal peduncle rather deep; ventral outline almost straight, curved upward slightly near the chin; dorsal outline considerably more convex than the lower. Anterior profile from snout to origin of the dorsal fin a gentle continuous curve. Head naked, medium in size, considerably compressed, the opercle ending in an obtuse fleshy flap above the pectoral fin. Gill membranes attached to the isthmus, only a small part of the posterior portion of the membrane free. Snout obtusely conical, the mouth terminal and horizontal, the gape reaching about two-thirds the distance from snout to eye. Lips full, with internal dermal folds. Anterior nostril with a short tube. Eye elliptical, its long axis horizontal, well below the upper profile and situated somewhat before the mid-length of the head.
Teeth;—Canines $2/4$, the upper canines slightly larger than the lower; teeth of the upper jaw becoming progressively larger as they progress forward, so that the teeth next to the canines are large, but are not likely to be confused as a second set of canines. A conspicuous posterior canine on each side.

Scales in 28 or 29 rows, rather large; $2\frac{1}{2}$ rows between the origin of the dorsal fin and the lateral line, $1\frac{1}{2}$ rows between the lateral line and the middle of the dorsal fin base. Scales of the nape becoming smaller before the dorsal fin, about six rows before the dorsal, the anterior ones difficult to observe, the rows not quite meeting across the nape. Scales on breast small.

Lateral line continuous, curved abruptly downward posteriorly, the straight portion found posteriorly on six scales only; lateral line pores simple, formed of a single canal and pore on each scale, the canal turned upward posteriorly on most of the scales.

Dorsal fin long, the first three spines becoming progressively longer, the remainder of the spines subequal and slightly longer than the third; rays more or less equal in height, higher than the spines. Membrane between spines of the dorsal continuing beyond the tip of the spines. Anal fin rays shorter than those of the dorsal, more or less equal in height; the spines weak and small. Pectoral fin base oblique, the tips of the rays not quite reaching the vent. Ventral fins originate under the posterior base of the pectorals, not reaching the vent, the longest rays somewhat filamentous. Caudal fin biconcave, the central rays as long as the outer ones.

Coloration: In life, middle of sides rich pinkish-lilac (Thulite pink of Ridgway); upper sides duller and each scale with a rich green edge; lower sides yellow and under surfaces white. Top of head and upper lip spinel pink, the lower portion of the head becoming first violet and then greenish blue. A broad viridine green band from snout to eye, broadest near the eye. Two similarly colored bands, the first from the eye to the shoulder, the second from the eye to the upper end of the preopercle. This second band is continued down the side of the fish, continuous and unbroken on the opercle, but zigzag and broken on the body,—found on alternate scales of two adjoining rows. On the upper anterior side is a rich deep turquoise spot, in shape much like two balls pressed closely together.

Dorsal fin pale blue with a pale yellow base and outer margin. Anal fin bright yellow with a blue margin and a narrow reddish-
orange band near to and paralleling the base. Pectoral fins clear translucent. Ventral fins pale blue. Caudal fin pale blue, its upper and lower margins greenish yellow, and with a blue and yellow pattern mesially as follows,—a narrow band of pale blue starting at the upper base of the fin and running to the tip of the middle rays of the caudal where it meets its fellow from the lower base of the fin; two narrower bands of similar blue inside of these, roughly paralleling them; bordering and surrounding these bands the color is bright yellow.

In one of the smaller cotypes, the pattern is similar but the general coloration of the sides is reddish pink. In this example the upper sides are reddish and the middle of the sides pink, while the yellow of the lower sides is concentrated into a band. In addition, there is a small black spot at the base of the caudal, and the central oblique bands on the caudal are lacking.

In preservative the general color is light buff, traces of the color pattern remaining with the exception of the band along the middle of the sides. This has disappeared in all of the specimens.

In addition to the species given above, the following have been added to the shore fish fauna of Bermuda. A number of these species are fairly well known to some of the Bermuda fishermen, but they are apparently unrecorded in the ichthyological literature of the island. *Pneumatophorus colias*, recorded many years ago from Bermuda but ignored by later students, is reestablished as a Bermuda fish, on the basis of a specimen taken by us in St. Georges Harbour.

*Amphioxides pelagicus* Günther
*Mustelus mustelus* (Linnaeus)
*Galeocerdo arcticus* (Faber)
*Carcharias falciformis* Bibron
*Prionace glauca* (Linnaeus)
*Myrophis dolichorhynchus* Parr
*Myrophis platyrhynchus* Breder
*Chilorhinus suensonii* Lütken
*Sphagebranchus ophioneus* Evermann and Marsh
*Myrichthys oculatus* Kaup
*Aphthalmichthys mayeri* Silvester
*Gymnothorax polygonius* Poey
*Gymnothorax albimentis* (Evermann and Marsh)
*Halocypselus obtusirostris* (Günther)
Cypselurus heterurus (Rafinesque)
Bregmaceros macclellandi Thompson
Etropus rimosus Goode and Bean
Pneumatophorus colias (Gmelin)
Peprilus paru (Linnaeus)
Chloroscombrus chrysurus (Linnaeus)
Argyreiosus vomer (Linnaeus)
Astrapogon stellatus (Cope)
Epinephelus mystacinus (Poey)
Trisotropis dimidiatus (Poey)
Gramma hemierysos Mowbray
Rypticus saponaceus (Bloch and Schneider)
Etelis oculatus (Cuvier and Valenciennes)
Inermia vittata Poey
Eucinostomus havana (Nichols)
Chaetodon sedentarius Poey
Clepticus parrae (Bloch and Schneider)
Xyrichthys splendens Castelnau
Scarus punctulatus Cuvier and Valenciennes
Sparisoma squalidum (Poey)
Sparisoma brachiale (Poey)
Eviota personata Jordan and Thompson
Lophogobius pallidus Parr
Gobius boleosoma Jordan and Gilbert
Gobiosoma longum Nichols
Callionymus boekei Metzelaar
Callionymus dubiosus Parr
Balistes forcipatus Gmelin
Xanthichthys ringens Linnaeus