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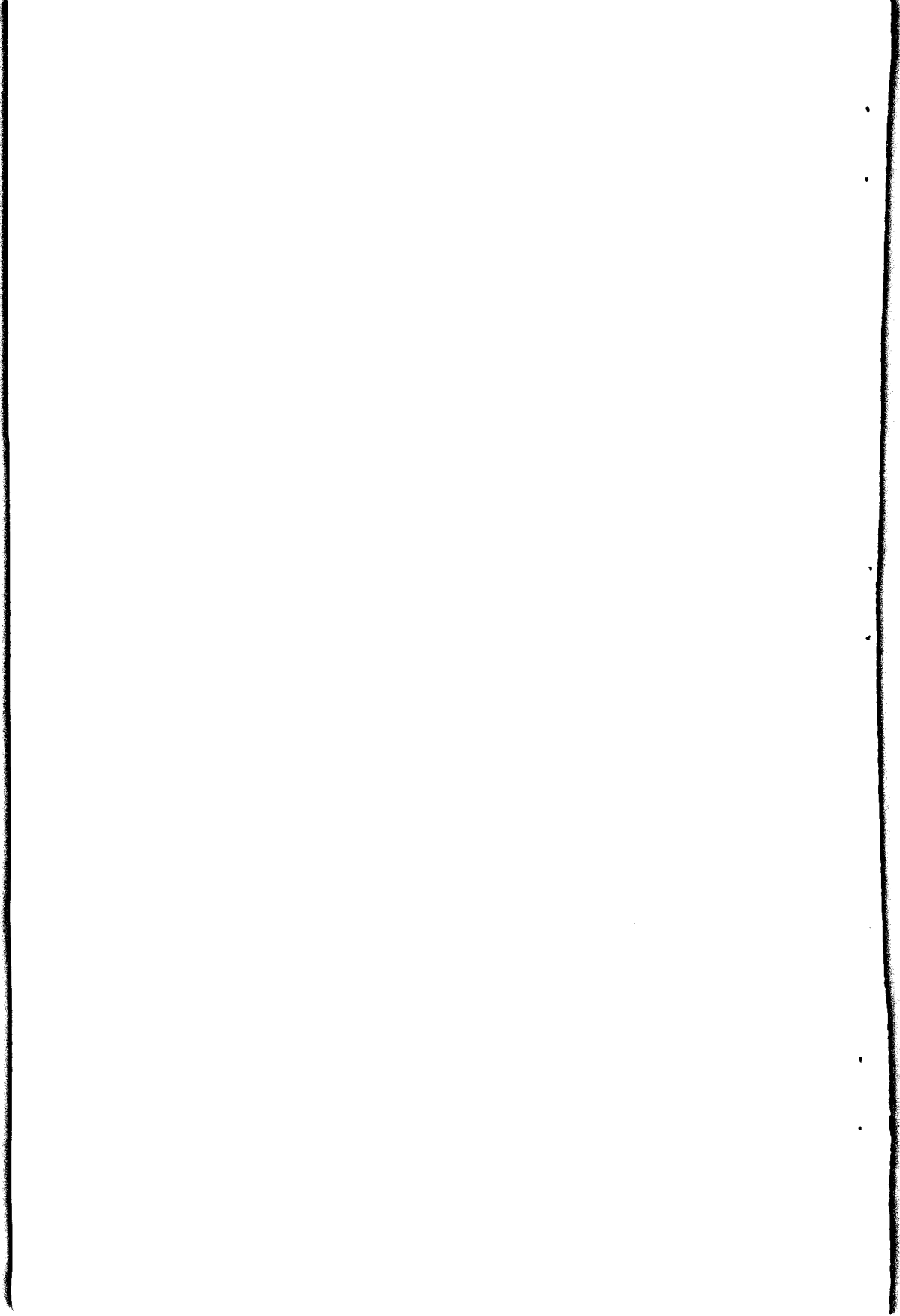
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SPECIFIC NAMES OF THE ATLANTIC AMERICAN
WHITE SHRIMP (FAMILY PENAEIDAE)

by

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Introduction

Penaeid shrimp are of special interest to zoologists for several reasons, one being the fact that they are unique among the decapod Crustacea in having a nauplius larval stage, which is otherwise found only in lower groups.

The shrimp catch of the south Atlantic and Gulf coasts in 1960 amounted to one-fifth of the total value of all fishery products of the United States (Power, 1961), and the shrimp fishery is the most valuable one in the country. The catch depends almost wholly upon three species, *Penaeus aztecus* Ives, *P. duorarum* Burkenroad and *P. setiferus* (Linnaeus), according to current usage. Up to about fifteen years ago the whole fishery depended upon the latter species, the North American white shrimp.

Because of their commercial importance, the penaeid shrimp are being studied increasingly in the Americas and other parts of the world. The literature, museum records and certain other information show that the name *Penaeus setiferus* has been misapplied for the past twenty-six years. The matter should be rectified now rather than later. The questions involved depend upon established rules of zoological nomenclature.

The following account will be easily understood if it is remembered that there are two species of Atlantic American white shrimp. This fact was ascertained by Burkenroad (1936) and prior to that time all workers assumed that there was only one species, which was referred to uniformly as *Penaeus setiferus* (Linnaeus). The northern species has been recorded only from the continent of North America. The southern species has been recorded throughout much of the West Indies and the east coasts of Middle and South America to southern Brazil.

Names of White Shrimp in the Literature
Early Work, 1761 - 1811

Guillaume Rondelet is reported by some early workers to have figured penaeid shrimp, but Linnaeus made no reference to his works.

Seba (1761) figured a penaeid shrimp to which he gave the name, "*Astacus fluviatilis, Americanus*." This magnificent work was published in three volumes between 1734 and 1761. Seba's names are not binominal and are considered to be pre-Linnaean, even though volume three is later than the tenth edition of the *Systema Naturae*. But Seba's shrimp figure is important because Linnaeus referred to it when he set up the species *Cancer setiferus* (*Systema Naturae*, 12th ed., 1767). I examined the figure in the Library of Congress copy of Seba (Vol. III, Plate 17, Figure 2).

It is evidently a penaeid and the only question is whether or not it could be one of the so-called grooved shrimp (those with long adrostral carinae, *P. aztecus*, *P. duorarum* or *P. brasiliensis*). However, some of the early workers saw the less noticeable dorsal sulcus on the telson of these shrimp and possibly the long rostral grooves would have been noticed, too. The walking legs all appear to be bifid, but not clearly chelate, as Say (1817) says all six of them were portrayed. Linnaeus' remarks may also be interpreted as "six double clawed feet on both sides". In spite of these doubtful points, Seba's figure has been accepted as the original one of *Penaeus setiferus* because it was so designated by Linnaeus.

With regard to the distribution of *Cancer setiferus*, Linnaeus (1767, p. 1055) stated "*Habitat in Indiis*". Since Seba's use of the *Americanus* in the name was the only locality reference he gave, it appears that Linnaeus was referring to the West and not the East Indies, and that assumption has been commonly accepted.

The next reference to *Cancer setiferus* is in the thirteenth (Gmelin) edition of *Systema Naturae* (1790). The habitat is given as "*America australi et India*". Because of that statement Burkenroad (1939, p 18) says, "It is not impossible that the Linnaean imputation of American habitat to *C. setiferus* was derived from Seba, and that the type was a specimen from the East Indies which somewhat resembled Seba's plate;". Due to the way it is worded, this remark of Burkenroad's is not questionable, but it is more likely that between the time of the twelfth and thirteenth editions of the *Systema* some East Indian shrimp were added to the Linnaean collections, which Gmelin and his co-workers could not differentiate from the American *C. setiferus*. It is even more probable that Gmelin did not add the qualifying West to India, a common failing of early writers. Earlier workers sometimes referred to this insular group as the West India Islands, and it is only in the past eighty years or so that this usage has gone out of style. Be that as it may, subsequently the name was employed exclusively for Atlantic American material.

The next reference is that of Herbst (1796), who said, "Es lebt dieser Krebs in den Amerikanischen Flüssen, . . ." He gave a figure (Table 34, Figure 3), and gave the names of Seba and Linnaeus as synonyms for his name, *Cancer (Gammerellus) setiferus*. Olivier (1811), gave all of the above names as synonyms and used the name *Palaemon setiferus*. He said, p. 660, "Il se trouve dans les fleuves de l'Amerique meridionale."

Thus, there are five works referring to the geographic distribution of the shrimp, later called *Penaeus setiferus*, published between 1761 and 1811. They are summarized as follows:

Seba (1761)	<i>Astacus fluviatilis</i>	America
Linnaeus (1767)	<i>Cancer setiferus</i>	Indies
Gmelin (Linnaeus) (1790)	<i>Cancer setiferus</i>	South America and India
Herbst (1796)	<i>Cancer (Gammerellus) setiferus</i>	America
Olivier (1811)	<i>Palaemon setiferus</i>	South America

At the time Seba wrote the Dutch had no holdings in North America, but they did have holdings in South America, and it is more likely that Seba's specimens came from there than from the north. Linnaeus' subsequent use of "Indiis" for the habitat reinforces that assumption. The four Linnaean and post-Linnaean works refer to the Indies and South America three times as the locale of the shrimp later known as *Penaeus setiferus* (Linnaeus), and to "America" once. There was no reference to North America and no indication that penaeid shrimp existed in North America, and that was the situation when Say (1817) wrote.

The Name of the North American White Shrimp

Say gave a valid description of the North American white shrimp as *Penaeus fluviatilis*, and made the first mention of the species in the literature, this being also the first mention of a penaeid shrimp in North America. He designated a definite locale for the species, the coasts of the southern states of the United States and Florida (which was then a Spanish possession). No other species of shrimp with short adrostral carinae has ever been recorded from the eastern shore of continental North America. Say's designation is easily the most precise in the shrimp literature up to his time and there is no reasonable way by which it can be questioned or set aside.

Say referred to no previous author except Seba, whose name is invalid. Therefore, Say's name, *P. fluviatilis*, is first under the Rules. Whether Say avoided other previous works on purpose or through lack of knowledge is unknown. However, he followed Seba's name, which he did not think was a good one because the shrimp was not an inhabitant of rivers, although he stated that it was found in the mouths of rivers "probably as high as salt water extends." His color notes show that he was acquainted with the animal in life. He said that great numbers were caught in the estuaries by cast-nets and brought to market, sometimes as far north as Philadelphia.

In extenuation of the early workers who gave the rivers as habitats of white shrimp, it should be noted that differences between rivers and low salinity estuaries were not clear then, and even today there is sometimes confusion. It should be noted that Olivier (1811) used the word "fleuves", which refers to rivers emptying into the sea, as differentiated from the inland "rivières".

Say's name was used in synonymy by Hay (1918), Boone (1930) and Burkenroad (1934 and 1939); it has not lapsed under the "fifty year rule".

Gibbes (1850) said specimens were present in the "Philadelphia cabinet", but apparently none remain today. Mr. F. H. Aldrich was kind enough to search Academy of Natural Sciences of Philadelphia collections for Say's *Penaeus* material, but none could be located. I have deposited in the U. S. National Museum six specimens of *Penaeus fluviatilis* Say which were caught by the Fish and Wildlife Service MV *Silver Bay* at station 3178 off Brunswick, Georgia. They consist of three males, 163, 149 and 152 mm. long and three females, 173, 175 and 181 mm. long, and are catalogued under the U. S. National Museum number 107160. Six females from the same *Silver Bay* station, ranging in length from 162 to 175 mm., have been deposited in the collection of the Academy of Natural

Sciences of Philadelphia. The collections were made through the courtesy of Mr. Harvey R. Bullis, of the Fish and Wildlife Service, Pascagoula, Mississippi, to whom I am indebted.

Burkenroad (1939) gave the distribution of this species from "critical records", as Fire Island, New York to Vera Cruz, Mexico, Cuba and Jamaica. Considerably more has been learned about distribution since then. There seems to be three discrete populations centered off the Georgia coast, the Louisiana coast, and the southern Gulf of Campeche, Mexico. There is no evidence that this shrimp ever has been found away from the shores of the North American continent, and Burkenroad's inclusion of Jamaica and Cuba within the range is incorrect. Burkenroad (1939, p. 17) has designated a neotype of this species under the name *P. setiferus*. It is fortunate that for various reasons, his designation has not been validated, since his action did not take all facts into consideration.

In summary, Say (1817) gave the first description and made the first mention of a North American white shrimp and all previous accounts relate to the Indies of South America or indefinitely, America. The valid name of the North American white shrimp is *Penaeus fluviatilis* Say.

Later Work, 1837 - 1939, and the Name of the South American White Shrimp

No works following Say (1817) have bearing upon the validity of his name, *P. fluviatilis*, (except that by using it as a synonym they preserved it), but they explain why the confusion of shrimp names was not cleared up by the several eminent zoologists who worked on penaeids later.

First, it should be repeated that no one realized that two species of shrimp were involved until Burkenroad (1936) described the West Indian, Central and South American species as *Penaeus schmitti*. (For locality records see Burkenroad, 1936 and 1939, pp. 19-20). The names of the two shrimp with short rostral grooves should have been applied properly at that time, but it was not done and the question was not considered until three years later (Burkenroad, 1939). His remarks were curiously misleading, and they led to the incorrect conclusion that the proper name of the South American white shrimp is *Penaeus schmitti*.

H. Milne Edwards (1837), who used the name *Penaeus setiferus*, synonymized the names of Seba, Linnaeus, Herbst, Olivier and Say, cited above, with his own specimens from the French island of Guadeloupe, and stated (p. 415) that the species is found in considerable numbers around the mouths of the rivers of Florida. Later workers followed this lead. Heller (1865) reported *Penaeus setiferus* from "Rio Janeiro", and as Burkenroad (1939, p. 18) said, "Following Heller, the range of *P. setiferus* has been universally considered to be from the United States to Brazil, until the recent separation of *P. schmitti*."

He states that H. Milne Edwards (1837), DeKay (1844), Gibbes (1850) and Heller (1865) all used *Penaeus setiferus* for the white shrimp, which is quite correct. However, DeKay and Gibbes were referring only to North American shrimp, which is *P. fluviatilis* as we have seen. Heller's single specimen came from Rio de Janeiro and Milne Edwards' specimen

or specimens were not North American by any long stretch of the imagination. Burkenroad's remarks are, p. 18, "H. Milne Edwards, 1837, synonymizes *P. fluviatilis* with the Linnean species and presumably derives from Say the statement that *Penaeus setiferus* inhabits the mouths of the rivers of Florida [since according to Bate, 1881, the surviving Edwardsian specimen is labelled "Guadeloupe" (a most indefinite provenance perhaps referring to San Antonio Bay, Texas, at the mouth of the Guadeloupe River)]." That peculiar interpretation is clearly incorrect. The French island of Guadeloupe in the West Indies is a most definite provenance and lies within the range of the southern white shrimp. (Bate probably misspelled it.) French naturalists and collectors have worked in that area since the days of Father Charles Plumier and it is almost certain that Milne Edwards' specimens derived from there. Rio Guadalupe of Texas has a Spanish spelling and in 1837, and before, it was inhabited by no one except a very primitive tribe of Indians, the Carancahuas, and a few traveling Spanish (and later Mexican) soldiers, who were certainly not recognized collectors of natural history specimens. That Bate (1881) looked upon Milne Edwards' material as West Indian is shown by the following remarks concerning certain material in the Jardin des Plantes, listed as *P. indicus* (p. 178), ". . . ; but these bear the impress of having been named by others than the veteran author of 'Histoire des Crustacés!' they agree more nearly with *Penaeus setiferus* of the West Indies, . . ." H. Milne Edwards equated his species with the then well known North American species because all naturalists assumed at that time that one species extended over both North and South America. But as stated above, none of the writing or synonyms following Say (1817) has any bearing upon the name of the North American species.

Linnaeus (1767), Gmelin (1790), Olivier (1811), Milne Edwards (1837) and Heller (1865) all applied *Penaeus setiferus* to shrimp from the Indies or South America. Burkenroad's remarks that de Saussure (1858) first applied the name to shrimp from definite localities outside the United States is misleading. It is incorrect with regard to H. Milne Edwards, and although the earlier workers did not give small, specific localities, they gave general ranges all within the known area of the South American white shrimp. Furthermore, de Saussure's paper was no hallmark or turning point in taxonomy and Burkenroad's statement in this regard carries no authority. In fact, de Saussure's Cuban specimens were almost certainly the southern white shrimp. Pérez-Farfante (1954) has shown that the southern white shrimp (listed as *P. schmitti*) is present in commercial quantities in Cuba, but the northern species has never been taken there. A letter from her dated 31 May 1961 confirms that conclusion.

Burkenroad (1939, p. 19) also said, "Despite doubt as to the precise nature of the Linnean types, usage would seem to make desirable retention of the name *Penaeus setiferus* for one of the Atlantic American species with short adrostral carinae. Inasmuch as definite records of '*Penaeus setiferus*' from areas outside of the present known range of the northern species did not appear in the literature until relatively very late, it has seemed proper to restrict the Linnean name to the northern species." No one can disagree with the first sentence, but the last one is definitely erroneous. Linnaeus (1767), Gmelin (1790) and Olivier (1811) referred only to the range of the southern white shrimp. Other references, which refer to definite records of the southern white shrimp as *Penaeus setiferus*

are H. Milne Edwards (1837), de Saussure, *auct.* (1858), Heller (1865), Bate (1881), and Rathbun (1897 and 1900). The localities are Guadeloupe, Cuba, Rio de Janeiro, Jamaica and Maceio, Brazil. Beginning with Linnaeus, this makes an average of one reference to the southern species as *Penaeus setiferus* every fifteen years between 1767 and 1900. The last six records are by workers who caught the shrimp or examined museum specimens, and do not include citation records which I have made no attempt to enumerate. During the same period the only similar reference to the northern species as *Penaeus setiferus* are DeKay (1884), Gibbes (1850), Stimpson (1871) and Kingsley (1879).

Say (1817) validly named the North American white shrimp *Penaeus fluviatilis* and there is no point upon which his designation can be set aside. On the other hand, the long taxonomic tradition of the specific name *setiferus* for the South American white shrimp, extending back to Linnaeus, cannot be capriciously overthrown. Thus, there is no gain-saying the fact that the correct name of the West Indian and South American white shrimp is *Penaeus setiferus* (Linnaeus), and *P. schmitti* Burkenroad is a synonym. The types of Linnaeus have been lost, and according to Bate only one of Milne Edwards' specimens remained in 1881. Heller's specimen is probably gone with World War II. Burkenroad's types of *P. schmitti* could stand as neotypes of *Penaeus setiferus* (Linnaeus). However, according to the 1961 Code, neotypes are not needed for either of the Atlantic American white shrimp, and probably they could not be validated for various reasons.

There remains the rather inconsequential question of *Penaeus orbignyana* of P. A. Latreille (1817), which H. Milne Edwards said was not differentiable from *P. setiferus*. Latreille's shrimp was reputed to have come from the Bay of Biscay, a highly doubtful locality, and the type has been lost, as Burkenroad has shown. It throws no light upon any question and seems best relegated to the status of a *nomen dubium*.

Almost every member of the Division of Marine Invertebrates of the U. S. National Museum helped me at one time or another in obtaining literature, and I am indebted to them. I am also indebted to Drs. F. A. Chace, Jr., and Frederick M. Bayer for discussing taxonomic points with me.

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