

# GENERAL CONSIDERATIONS ON THE PENEIDS OF NORTH AND NORTHEAST OF BRAZIL

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The study of the sistematics, distribution, ecology and fishery of peneids along the Atlantic coast of South America has increased since 1960. However, with reference to the North and Northeast coast of Brazil, the bibliography is somewhat reduced.

The papers by Fausto Filho (1965, 1966a, 1966b, 1967), Nomura & Fausto Filho (1966) and Paiva (1967) enlarged a little the knowledge about the peneids of the North and Northeast of Brazil. These papers complemented previous studies about this area effected by Lemos (1956), Lindner (1957), Nakamura *et al.* (1957, 1958, 1963), Bullis Jr. & Thompson (1959), and Coêlho (1963).

The present paper intends to give a general view about the sistematics, distribution, ecology and fishery knowledge on the peneids along the North and Northeast coast of Brazil.

## DIVISION INTO AREAS

Owing to the extent of coast of the North and Northeast of Brazil, and its peculiarities, we may divide it into areas, according with the types of bottom in the continental shelf and the potenciality of shrimp resources.

### North area

Sub-area I — from Cape Orange to the mouth of Pará River;

Sub-area II — from the mouth of Pará River to the mouth of Parnaíba River.

### Northeast area

Sub-area I — from the mouth of Parnaíba River to the Cape São Roque;

Sub-area II — from Cape São Roque to the mouth of São Francisco River.

## NORTH AREA

### Sub-area I

The coast is low and relatively smooth. In the continental shelf there is an extensive patch of mud along and near the coast, in all its width. Beyond this patch there is another patch of a mixture of sand, mud and assorted organogenous material.

Up to the present, the following species of peneids are refered for this sub-area: *Solenocera atlantidis* Burkenroad, *Trachypenaeus similis* (Smith), *Sicyonia dorsalis* Kingsley, *Xiphopenaeus kroyeri* (Heller), *Penaeus schmitti* Burkenroad, *Penaeus aztecus subtilis* Farfante, and *Penaeus duorarum notialis* Farfante.

This sub-area seems to be quite promising to the commercial exploitation of shrimps. The notes by Lindner (1957) and Nomura & Fausto Filho (1966) and the prospections made by the vessels "Toko-Maru" (1956-1957) and "Oregon" (1957) give a demonstration of the shrimp resources potenciality. From these studies we conclude that the species *Penaeus aztecus subtilis* Farfante, and *Xiphopenaeus kroyeri* (Heller) are abundant in this sub-area and could be successfully commercialy exploited, mainly the former species.

The nature of the bottom of the continental shelf in this sub-area provides very good conditions for the development of the species *Penaeus aztecus subtilis* Farfante and *Xiphopenaeus kroyeri* (Heller).

At the moment, in spite of the potenciality of this sub-area, the shrimp fishery presents reasonable and primitive characteristics, simultaneously.

In this sub-area motorized boats of the type "otter-trawler" with good equipment are operating quite far from the coast, about 100 nautical miles at an average depth of 100

meters, between latitudes 1°—3°N and longitudes 48°—49°W. These boats are all of foreign countries. Fausto Filho & Nomura (1966) noted this type of fishery and verified the abundance and predominance of the species *Penaeus aztecus* Ives over the other penaeids captured, followed by the species *Xiphopenaeus kroyeri* (Heller) and *Penaeus schmitti* Burkenroad.

With reference to the primitive fishery, of low productivity, it is effected by means of beach seine nets, or trap nets, near the beaches.

No statistical data on the shrimp fishery of this sub-area is available.

#### Sub-area II

The coast is quite typical, been not so smooth, and with innumerous small coves. The continental shelf is somewhat narrower and there is not the enormous patch of mud found in the previous sub-area. This facies of mud is substituted by a litoral sand stretch of almost similar width. As in sub-area I, beyond this stretch there is another one, less continuous and narrower of mud, sand and organogenous materials.

According to the material collected in this sub-area, we record the occurrence of the following species: *Penaeus aztecus subtilis* Farfante, *Xiphopenaeus kroyeri* (Heller), *Penaeus schmitti* Burkenroad, and *Penaeus duorarum notialis* Farfante. The latter, according to Farfante (1967).

The abundance of the above referred species in the sub-area is notorious, although it is little studied, considering the quantity of shrimps captured and the type of fishery utilized. For this sub-area a production of 9,187 tons is registered for 1966, according to the official statistics.

It seems that the absence of mud bottom and the occurrence of a litoral sand stretch in this sub-area, determine the substitution of the species *Penaeus aztecus subtilis* Farfante, that predominates in the previous sub-area, by the species *Xiphopenaeus kroyeri* (Heller), where it is more abundant. Also the presence of zones composed of mixed facies of algae and assorted fragments, in large numbers, far from the coast beyond the sandy stretch, may influence the predominance of *Xiphopenaeus kroyeri* (Heller) over *Penaeus aztecus subtilis* Farfante.

The existence in the coast of Maranhão State of innumerous indentations caused by outflow of many rivers, could proporcionate a better environment for the species *Xiphopenaeus kroyeri* (Heller), that does not demand bigger depths as *Penaeus aztecus subtilis* Farfante.

As in the previous sub-area analyzed, the shrimps fishery is also primitive, with the same kinds of gears. However, the yearly production is quite significative. It is almost a quarter of the total brazilian shrimp production. According to Lindner (1957) and Coêlho (1963) the species of shrimps caught, by means of beach seine nets, are mostly *Xiphopenaeus kroyeri* (Heller), *Penaeus aztecus* Ives, and *Xiphopenaeus kroyeri* (Heller), composing 60% of the total output.

#### NORTHEAST AREA

##### Sub-area I

This sub-area is characterized by a very regular sandy coast, with practically no big rivers. The rivers outflowing in this sub-area are temporary, with insignificant mouths.

The type of bottom in the continental shelf is quite different from the previous ones referred. It is narrower and presents besides the litoral sandy stretch a bottom of calcareous algae far wider than the former and far from the coast. This type of bottom also presents small scattered coral formations and "casca-lho", a bottom of coarse sand, small stones, calcareous algae and broken shells.

For this sub-area we recorded, according with the material captured, the following species: *Penaeus aztecus subtilis* Farfante, *Penaeus schmitti* Burkenroad, *Xiphopenaeus kroyeri* (Heller), *Trachypenaeus constrictus* (Stimpson), ? *Parapenaeus* sp., *Metapenaeopsis* ? *goodei* (Smith), *Solenocera atlantidis* Burkenroad, *Sicyonia dorsalis* Kingsley, *Sicyonia typica* (Boeck), *Sicyonia parri* Burkenroad, and *Sicyonia laevigata* Stimpson.

With respect to the potenciality of the penaeids in this sub-area, it seems to be quite reduced and there is nothing to justify, at present, the use of modern fishing gears.

The ecological conditions of the bottom do not favour a good development of shrimps for commercial purposes, that require propi-cial mud bottoms.

The penaeids less exigent to mud substrate, like the sicionids, are well represented and relatively abundant, finding in bottoms of calcareous algae and rocks a quite favorable environment; but owing to their small size are not commercialy exploited.

In this sub-area the primitive fishery is effected in a similar manner to the previous referred ones, and the production is insignificant. Official statistics recorded for 1966 a production of 28 tons for the Ceará State and 24 tons for the Rio Grande do Norte State. As always the species *Xiphopenaeus kroyeri* (Heller) represents more than 50% of the total production. Fausto Filho (1965) regis-

tered for the County of Fortaleza (Ceará — Brazil) that 90% of the shrimp catches belongs to the species *Xiphopenaeus kroyeri* (Heller).

#### Sub-area II

The general characteristics of the coast in this sub-area are very similar to the previous sub-area, differing only by the presence of perennial rivers with wider mouths.

The continental shelf is quite narrower and the characteristics of the bottom change a little, presenting a litoral sandy stretch and a bigger area with coral formations. The stretch of calcareous algae is almost of the same width as the one in sub-area I.

For this sub-area we recorded the occurrence of the following species: *Penaeus aztecus subtilis* Farfante, *Penaeus schmitti* Burkenroad, *Xiphopenaeus kroyeri* (Heller), *Sicyonia dorsalis* Kingsley and *Sicyonia typica* (Boeck).

This sub-area, although everything indicates a weak potentiality of peneids, is on a more advantageous position regarding bottom types, for there is a higher outflow of fresh water in its litoral and, consequently, more mud accumulates near the mouth of the rivers.

As in all previously referred sub-areas, the shrimp fishery is accomplished under similar primitive condition. According to the official statistics, a total production of 219 tons was recorded for this sub-area, in 1966, being 31 tons for Paraíba State, 50 tons for Pernambuco State and 138 tons for Alagoas State.

#### DISCUSSION

From the above mentioned, the coasts and bottoms of the North area give good conditions for the development of peneid shrimps, *Penaeus aztecus subtilis* Farfante and *Xiphopenaeus kroyeri* (Heller), the former in sub-area I and the latter in sub-area II.

The bottom of the continental shelf in sub-area II of the North coast seems not to be indicated for the utilization of shrimp modern fishery methods, according to available data, although little has been researched in the sub-area about this subject. The same applies to the Northeast area.

With respect to the systematics and distribution of the peneids in these areas, it is noted that the number of species in the family presently known is relatively large. Most of the species recorded for Surinam have already been collected. Only the following species are not yet recorded: *Solenocera geijskesi* Holthuis, and *Sicyonia stimpsoni* Bouvier, according to the list of Surinam peneids, prepared by Boschi (1964).

The records in this note of the species *Metapenaeopsis ?goodei* (Smith) and *?Parapenaeus* sp. are based, the former in information (*in litt.*) kindly supplied by Dr. L. B. Holthuis based on Rathbun (1900 — *Proc. Washington Acad. Sci.*, vol. 2, p. 152), where the occurrence of this species is recorded for the city of Maceió, and the latter, in a specimen obtained in the digestive tract of a red snapper, *Lutjanus ?vivanus* (Cuvier & Valenciennes), captured off the coast of Ceará State.

The species referred by Nomura & Fausto Filho (1966) as *Penaeus aztecus* Ives, *Solenocera ?geijskesi* Holthuis and *Trachypenaeus constrictus* (Stimpson) are *Penaeus aztecus subtilis* Farfante, *Solenocera atlantidis* Burkenroad, and *Trachypenaeus similis* (Smith) respectively, according to Farfante (*in litt.*).

The record for the species *Penaeus duorarum notialis* Farfante, in this paper, is based in Farfante (1967). Up to the present this species was not captured by the author in the areas now studied.

#### CONCLUSIONS

1 — The North area presents enormous possibilities for the fishery of peneid shrimps, mainly in its sub-area I.

2 — The Northeast area seems to be potentially poor of shrimps resources, mainly in its sub-area I.

3 — The species *Penaeus aztecus subtilis* Farfante and *Xiphopenaeus kroyeri* (Heller) comprise almost the totality of the landed shrimps, the former being the predominant species in the Northern sub-area I and the latter, predominant in all other sub-areas.

4 — Only in the Northern sub-area I and very far from the coast, the fishery is reasonable and productive. In all other sub-areas it is only primitive and of little production, mainly in the Northeast sub-area I.

5 — For the North and Northeast coasts of Brazil the following species of peneids are recorded: *Xiphopenaeus kroyeri* (Heller), *Penaeus schmitti* Burkenroad, *Penaeus aztecus subtilis* Farfante, *Penaeus duorarum notialis* Farfante, *Trachypenaeus similis* (Smith), *Trachypenaeus constrictus* (Stimpson), *Metapenaeopsis ?goodei* (Smith), *?Parapenaeus* sp., *Sicyonia dorsalis* Kingsley, *Sicyonia typica* (Boeck), *Sicyonia parri* Burkenroad, and *Sicyonia laevigata* Stimpson.

#### SUMMARY

In the present paper the author makes some general comments on the systematics, distribution, ecology, and fishery of peneid

shrimps found along the North and Northeast coast of Brazil.

The North and Northeast coasts of Brazil are divided into distinct areas, according to higher or lower potenciality of shrimp resources and type of bottom of the continental shelf.

The following areas are considered: North area — sub-area I (from Cape Orange to the mouth of Pará River) and sub-area II (from the mouth of Pará River to the mouth of Parnaíba River); Northeast area — sub-area I (from the mouth of Parnaíba River to Cape São Roque) and sub-area II (from Cape São Roque to the mouth of São Francisco River).

Regarding the shrimp fishery in the studied areas it is noted the reasonable manner it is effected along Amapá Territory in Northern sub-area I, with motorized boats of foreign countries. The primitive fishery takes place in the other sub-areas by means of beach seine nets, of low productivity. For the latter, the official data on the landings in 1966 are the following: Maranhão State, 9,187 tons; Ceará State, 28 tons; Rio Grande do Norte State, 24 tons; Paraíba State, 31 tons; Pernambuco State, 50 tons; and Alagoas State, 138 tons. In the landings the species *Xiphopenaeus kroyeri* (Heller) represents more than 50% of the total production, followed by the species *Penaeus aztecus subtilis* Farfante and *Penaeus schmittii* Burkenroad.

For the North and Northeast coast of Brazil the following species of peneids are recorded: *Xiphopenaeus kroyeri* (Heller), *Penaeus schmittii* Burkenroad, *Penaeus aztecus subtilis* Farfante, *Trachypenaeus similis* (Smith), *Trachypenaeus constrictus* (Stimpson), *Metapenaeopsis ?goodei* (Smith), *?Parapenaeus* sp., *Sicyonia dorsalis* Kingsley, *Sicyonia typica* (Boeck), *Sicyonia parri* Burkenroad, and *Sicyonia laevigata* Stimpson.

The occurrence of the species *Metapenaeopsis ?goodei* (Smith), *Penaeus duorarum notialis* Farfante and *?Parapenaeus* sp. in the studied area is discussed.

Notes on the distribution and abundance of the peneid shrimps along the North and

Northeast coasts of Brazil are given, including their known common names.

## BIBLIOGRAPHY

- Boschi, E. E. — 1964 — Los peneideos de Brasil, Uruguay y Argentina. *Bol. Inst. Biol. Mar.*, Mar del Plata, (7) : 37-41.
- Bullis Jr., H. R. & Thompson, J. R. — 1959 — Shrimp exploration by the M/V *Oregon* along the northeast coast of South America. *Comm. Fish. Rev.*, Washington, 21 (11) : 1-9, 7 figs.
- Coelho, R. R. — 1963 — Aspectos bio-tecnológicas da pesca marinha no Maranhão, Piauí e Ceará. *Bol. Est. Pesca*, Recife, 3 (6) : 8-18, 6 figs.
- Farfante, I. P. — 1967 — A new species and two new subspecies of shrimp of the Genus *Penaeus* from the Western Atlantic. *Proc. Biol. Soc. Wash.*, Washington, 80 : 83-100, 4 figs.
- Fausto Filho, J. — 1965 — Dados sobre a pesca de camarões em Mucuripe. *Col. Est. Pesca*, Fortaleza, 1 : 33-36, 1 fig.
- Fausto Filho, J. — 1966a — Primeira contribuição ao inventário dos crustáceos decápodos marinhos do nordeste brasileiro. *Arq. Est. Biol. Mar. Univ. Fed. Ceará*, Fortaleza, 6 (1) : 31-37.
- Fausto Filho, J. — 1966b — Sobre os peneideos do nordeste brasileiro. *Arq. Est. Biol. Mar. Univ. Fed. Ceará*, Fortaleza, 6 (1) : 47-50, 10 figs.
- Fausto Filho, J. — 1967 — Segunda contribuição ao inventário dos crustáceos decápodos marinhos do nordeste brasileiro. *Arq. Est. Biol. Mar. Univ. Fed. Ceará*, Fortaleza, 7 (1) : 11-14.
- Lindner, M. J. — 1957 — Survey of shrimp fisheries of Central and South America. *U. S. Fish. Wildl. Serv., Sp. Sci. Rep.*, Washington, (235) : 1-166, 22 figs.
- Nakamura, H. et al. — 1957 — *Tôkô Maru ni yoru kaigai guioaba tchôsa — Gaikyô hokokusho*. Suisan — tchô, Tokio, 121 pp., 6 maps.
- Nakamura, H. et al. — 1958 — *Tôkô Maru ni yoru tchunambei guioaba tchôsa hokokusho (1956 nen 10 gatsu nen 7 gatsu)*. Suisan-tchô, Tokio, 6 + 279 pp., 176 figs., 2 + 228 pp., 104 + 16 figs.
- Nakamura, H. et al. — 1963 — *Survey report on the Brazilian fishing grounds by the Tôkô Maru* (translated from Japanese). Tokio Fishery University, Tokio, 388 pp., illus.
- Nomura, H. & Fausto Filho, J. — 1966 — Shrimp survey in coastal and offshore waters of northeastern and northern Brazil. *Arq. Est. Biol. Mar. Univ. Fed. Ceará*, Fortaleza, 6 (1) : 15-29, 1 fig.
- Paiva, M. P. — 1967 — Considerações sobre os recursos pesqueiros marinhos do Estado do Maranhão. *Equipescas Jornal*, Campinas, 4 : [6-7], [2] figs.
- Williams, B. A. — 1965 — Marine decapod crustaceans of Carolinas. *U. S. Fish. Wildl. Serv., Fish. Bull.*, Washington, 65 (1) : 1-298, 252 figs.

T A B L E I

Distribution and abundance of the peneids along the litoral of the North and Northeast of Brazil.

Species	North area		Northeast area	
	sub-area I	sub-area II	sub-area I	sub-area II
<i>Xiphopenaeus kroyeri</i>	xxx	xxx	xx	xx
<i>Penaeus aztecus subtilis</i>	xxx	xx	xx	xx
<i>Penaeus schmitti</i>	xxx	xx	xx	xx
<i>Penaeus duorarum notialis</i> *	x	x	o	o
<i>Trachypenaeus similis</i>	x	o	o	o
<i>Trachypenaeus constrictus</i>	o	o	x	o
<i>Metapenaeopsis ?goodei</i>	o	o	x	x
? <i>Parapenaeus</i> sp.	o	o	x	o
<i>Solenocera atlantidis</i>	x	o	x	o
<i>Sicyonia dorsalis</i>	x	o	xx	xx
<i>Sicyonia typica</i>	x	o	x	x
<i>Sicyonia parri</i>	o	o	x	x
<i>Sicyonia laevigata</i>	o	o	x	o

Remarks: xxx — abundant; xx — less abundant; x — rare; o — not yet registered; \* — based in Farfante (1967) .

T A B L E I I

Brazilian common names of the peneids captured along the litoral of the North and Northeast of Brazil.

Species	North area		Northeast area	
	sub-area I	sub-area II	sub-area I	sub-area II
<i>Xiphopenaeus kroyeri</i>	camarão-piticaia	camarão-piticaia	camarão-chifrudo	camarão-chifrudo
<i>Penaeus aztecus subtilis</i>	o	camarão-cabeçudo camarão-vermelho	camarão-branco	camarão-branco
<i>Penaeus schmitti</i>	camarão-branco	camarão-branco	camarão-branco	camarão-branco
<i>Penaeus duorarum notialis</i> *	o	o	o	o
<i>Trachypenaeus similis</i>	o	o	o	o
<i>Trachypenaeus constrictus</i>	o	o	camarão-branco	o
<i>Metapenaeopsis ?goodei</i>	o	o	o	o
? <i>Parapenaeus</i> sp.	o	o	o	o
<i>Solenocera atlantidis</i>	o	o	o	o
<i>Sicyonia dorsalis</i>	o	o	camarão-de-pedra	o
<i>Sicyonia typica</i>	o	o	camarão-de-pedra	o
<i>Sicyonia parri</i>	o	o	camarão-de-pedra	o
<i>Sicyonia laevigata</i>	o	o	camarão-de-pedra	o

Remarks: o — not yet registered; \* — based in Farfante (1967) .