

# Range extensions for eight species of western atlantic hermit crabs (Crustacea, Paguroidea).

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## Abstract

We record range extensions for eight species of hermit crabs from the western Atlantic. We also analyze the distribution of these species, based on the concept of distribution patterns developed by Melo.

**Key words:** Hermit crabs, distribution, patterns, biogeography.

## Introduction

The biogeographic distribution patterns of marine species are determined, mainly, by environmental factors, which influence both diversity and the composition of local faunas. Therefore, knowledge of these distribution patterns is fundamental to biodiversity studies and regional faunistic surveys (Melo, 1985; Nucci and Melo, 2000). Because coastal zones are continuously being altered by human activities, it is critical to detect and prevent loss of biodiversity in marine and coastal ecosystems (Ray, 1997).

Projects aimed at increasing knowledge of the Brazilian marine fauna are needed, because species may disappear without their presence ever having been known to science. Such studies are now being conducted under the Revizee (Recursos Vivos da Zona Econômica Exclusiva), a major project focused on increasing knowledge of the biotic resources of the Brazilian Exclusive Economic Zone. The collections made during this project have revealed a very diverse fauna from environments never before studied in Brazil. Fully half of the species evaluated here were collected during the Revizee project, which indicates the importance of integrated projects for increasing knowledge of the Brazilian marine fauna.

In this study we expand the geographic ranges of eight species of hermit crabs, and analyze the distributions of these species, based on the concept of distributional patterns developed by Melo (1985).

## Material and methods

The material examined came from the "Monitoramento", "Gedip" and "Revizee" projects, together with some specimens collected by L. R. L. Simone (Table 1). Collections were made with several types of dredges, from shallow water to depths of more than 500 m (Revizee station 6811). Specimens were stored in 70% ethanol and identified to species level, and deposited at the Museu de Zoologia/Universidade de São Paulo (MZUSP). Previous knowledge of the distributions of the eight species was based on work by Rieger (1998) and Melo (1999).

## Results

The specimens examined and projects are listed in Table 1. Figures 1 to 8 show the previously (Pv.D.-black squares) and presently (Pt.D.-white circles) known distribution of each species.

Table 1: Material examined.

SPECIES	N	PROJECT	PRESENT OCCURRENCE
<i>Cancellus ornatus</i>	1	Monitoramento - sta. 3	Rio de Janeiro
<i>Phimochirus occlusus</i>	5	Revizee - sta. 6661	S <sup>a</sup> o Paulo
<i>Catapagurus sharreri</i>	59	Revizee stas. 6661, 6666, 6665 and 6674	S <sup>a</sup> o Paulo
<i>Pylopagurus discoidalis</i>	1	Revizee - sta. 6786	Santa Catarina
<i>Oncopagurus gracilis</i>	7	Revizee stas. 6651, 6786, 6811 and 6815	Santa Catarina and Rio Grande do Sul
<i>Paguristes iris</i>	1	Gedip - sta. 465	Uruguay
<i>Iridopagurus iris</i>	2	Monitoramento - sta. 11 and Gedip - sta. 465	S <sup>a</sup> o Paulo and Uruguay
<i>Isocheles sawayai</i>	2	Collected by L. R. L. Simone	Venezuela

Discussion

Melo (1985), studying the composition of the brachyuran fauna in the area from the states of Rio de Janeiro to Rio Grande do Sul, observed that the species showed several kinds of distribution patterns, which he was able to categorize. Application of these patterns to distributional studies of marine organisms may be advantageous for refining the concept of biotic provinces, since the patterns can be studied simultaneously in both space and time, introducing the historical element which is basic for biogeographic studies. This allows a biogeographic definition of the species, because each species will conform to only one pattern. This also forms a basis for predicting the occurrence of species in areas where they have not yet been found (Melo, 1985; Nucci and Melo, 2000).

Of the species studied, *Isocheles sawayai*, *Phimochirus occlusus* and *Iridopagurus iris* belong to the "Antillean continuous pattern" (Figures 1, 2 and 3). This pattern is characteristic of species distributed continuously from Florida and the Antilles to southern Brazil. *Isocheles sawayai*, previously considered endemic to Brazil, has extended its distribution to Venezuela. This extension was probably influenced by the branch of the South Equatorial Current which runs northwest parallel to the shore, reinforced by the flow from the North Equatorial Current, and running strongly into the southern Caribbean and on through to the Yucatán Channel and Florida Straits (Briggs, 1974). Since the study of distribution by patterns makes predictions possible, we can infer that *Isocheles sawayai* is also present farther north, in the Antilles and Florida. The other two species showing the Antillean continuous pattern, *Phimochirus occlusus* and *Iridopagurus iris*, extend beyond the previously known southern limit (Rio de Janeiro), thus showing high ecological tolerance. The dispersal of both species seems to have been facilitated by the warm waters of the Brazil Current, the southern branch of the South Equatorial Current that runs parallel to the Brazilian coast.

Another pattern observed was the "Carolinian continuous", which includes species occurring from Cape Hatteras (North Carolina, U.S.A.) to southern Brazil. *Cancellus ornatus*, *Catapagurus sharreri* and *Pylopagurus discoidalis* (Figures 4, 5 and 6) belong to this pattern, the last having the broadest range, reaching Santa Catarina. Again, predicting according to the Carolinian continuous pattern, *Pylopagurus discoidalis* is probably present in Rio Grande do Sul or even in Argentina.

The "Amphi-Atlantic pattern" is represented by species which occur on both tropical sides of the Atlantic, the American coast and the western African coast, and are not present in other oceans. The only species showing this pattern recorded in the present study is *Oncopagurus gracilis*. The known distribution of this species along the Brazilian coast is now greatly enlarged, extending to Santa Catarina and Rio Grande do Sul (Figure 7). In the eastern Atlantic, *O. gracilis* has been recorded only in the Gulf of Guinea. This pattern agrees with the observation of Melo (1985), that most of the species showing this pattern have a wider latitudinal distribution in the western Atlantic than in the eastern Atlantic.



The “Argentinian pattern” includes the species occurring in near-coastal warm temperate waters, from Buenos Aires to Rio de Janeiro, influenced by the Falkland (Malvinas) Current. The southern limit of their distribution varies seasonally between Chubut and Cabo Blanco, but the northern limit is always Rio de Janeiro. The only species with this pattern recorded in the present study is *Paguristes iris*. This species has previously been considered endemic to Rio de Janeiro, but, according to the pattern model, extends to Uruguay (Figure 8).

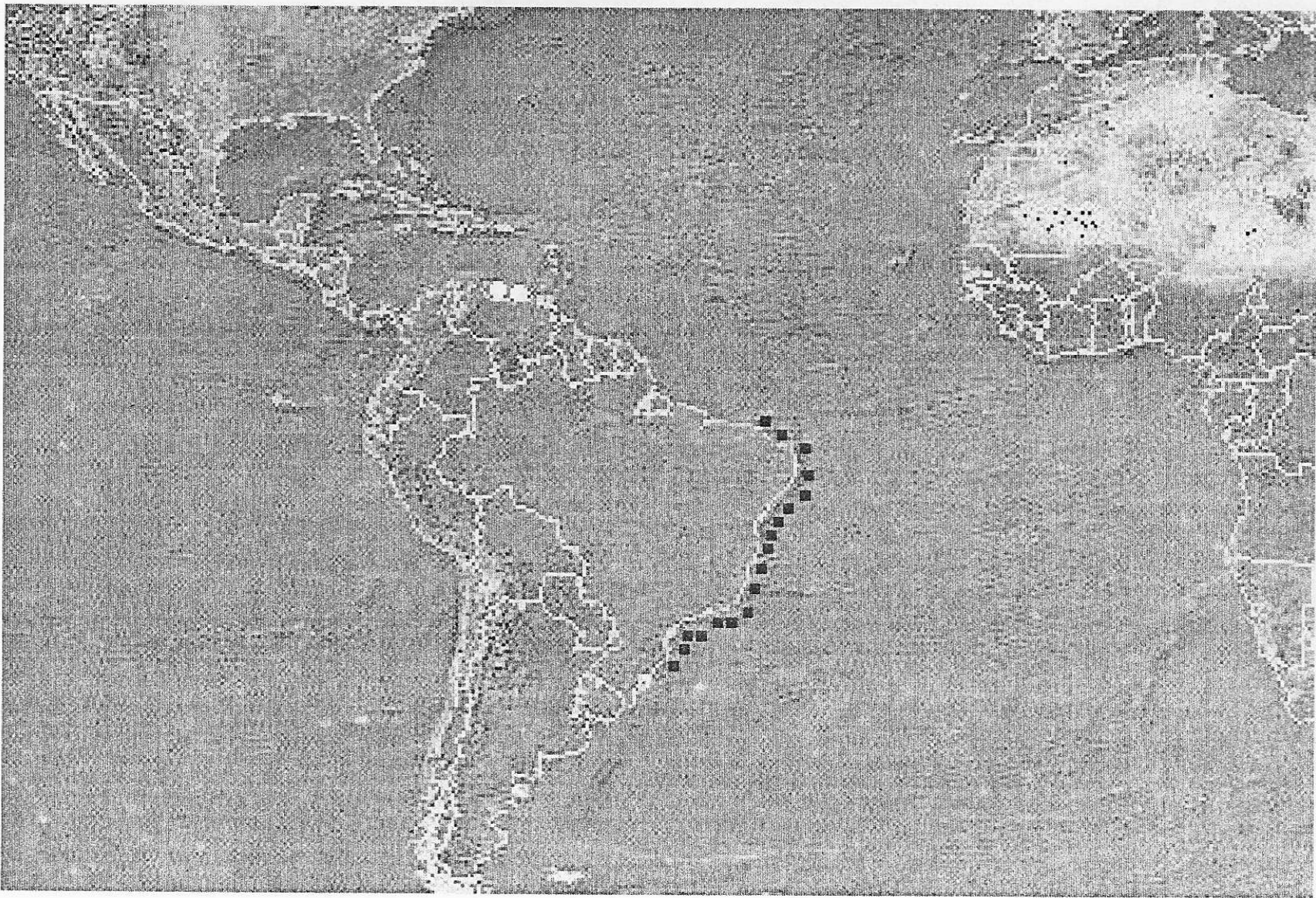


Figura 1: *Isocheles sawayai* Pv.D.- Western Atlantic: Brazil (Ceará to Santa Catarina). Pt.D.- Venezuela

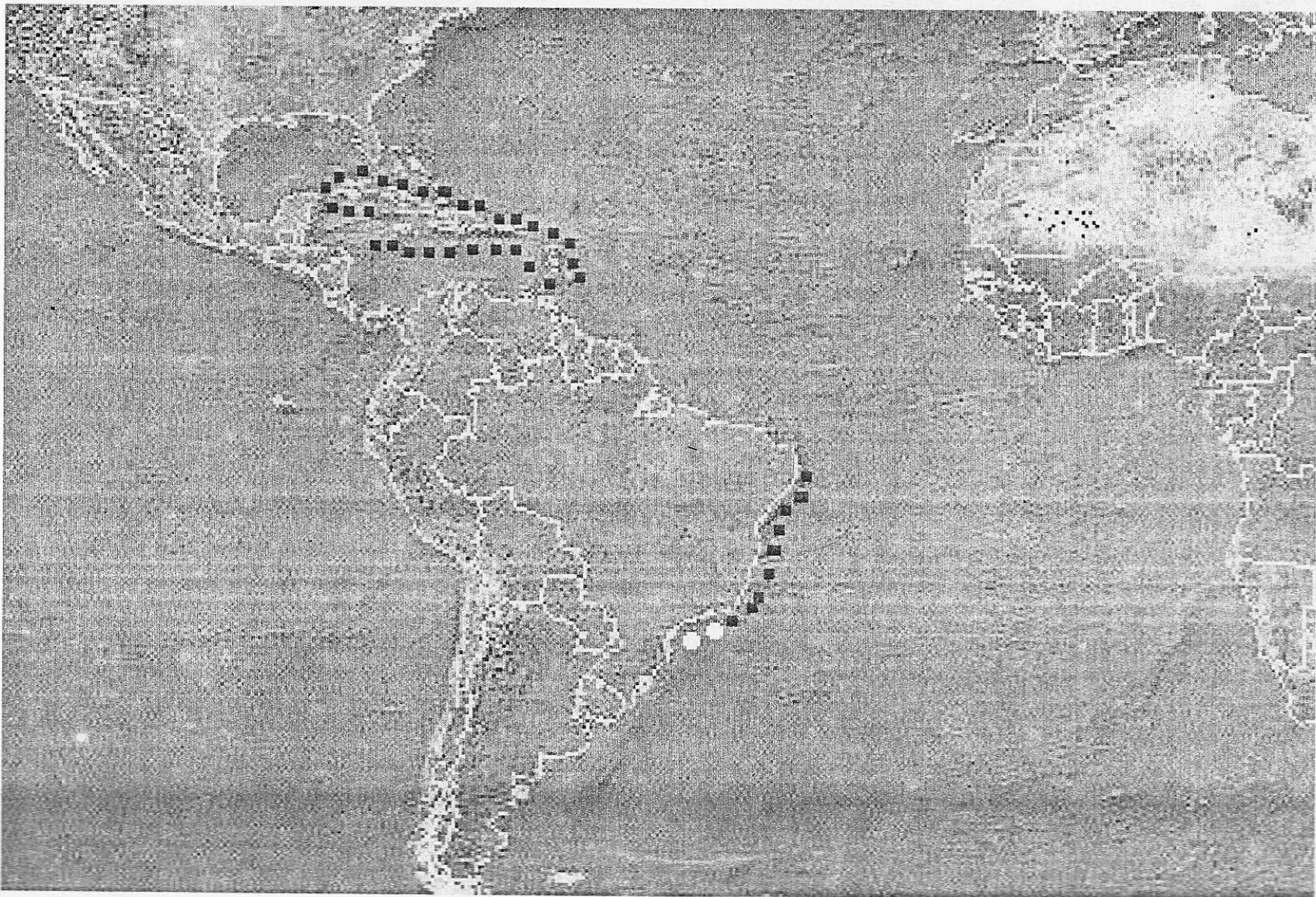


Figure 2: *Phimochirus ocellatus* Pv.D.- Western Atlantic: Antilles and Brazil (Pernambuco to Rio de Janeiro). Pt.D.- São Paulo.



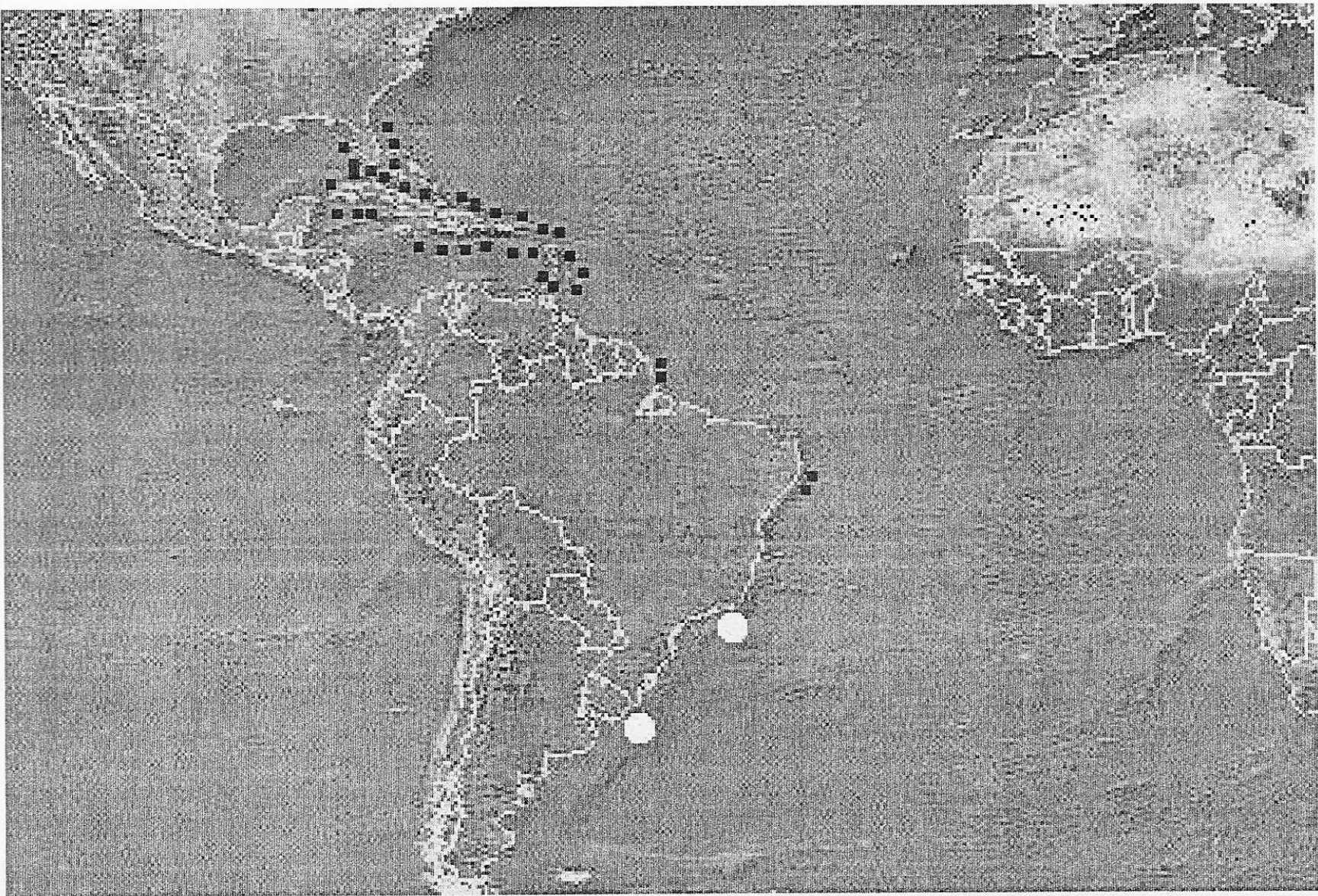


Figure 3: *Iridopagurus iris* Pv.D.- Western Atlantic: Florida, Antilles and Brazil (Amapá and Alagoas). Pt.D.- Rio de Janeiro and Uruguai.



Figura 4: *Cancellus ornatus* Pv.D.- Western Atlantic: North Carolina, Florida, Bahamas, Gulf of Mexico, Antilles, north of South America and Brazil (Pernambuco to Bahia). Pt.D.- Rio de Janeiro.



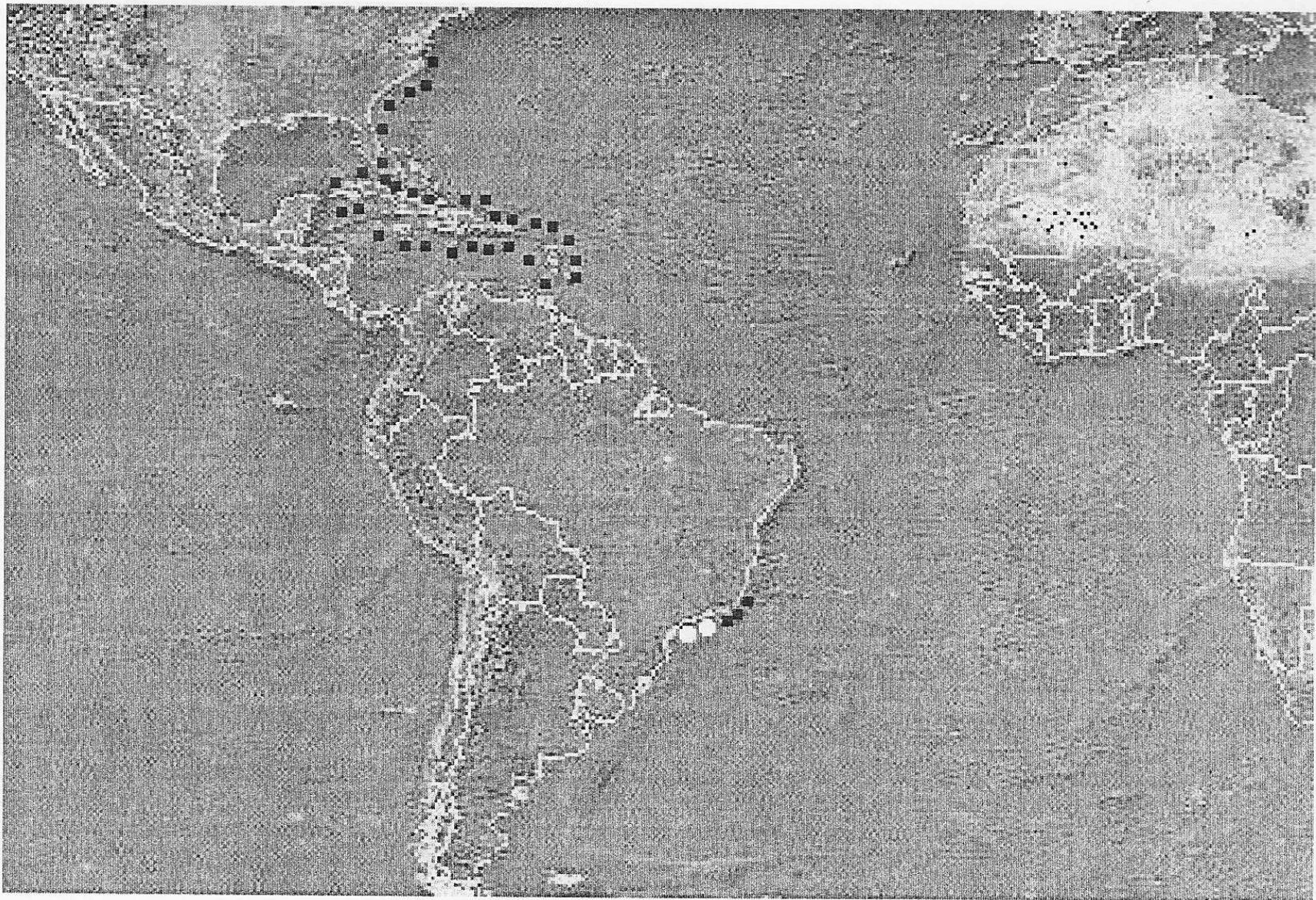


Figure 5: *Catapagurus sharreri* Pv.D.- Western Atlantic: eastern USA, Antilles and Brazil (Rio de Janeiro). Pt.D.- São Paulo.

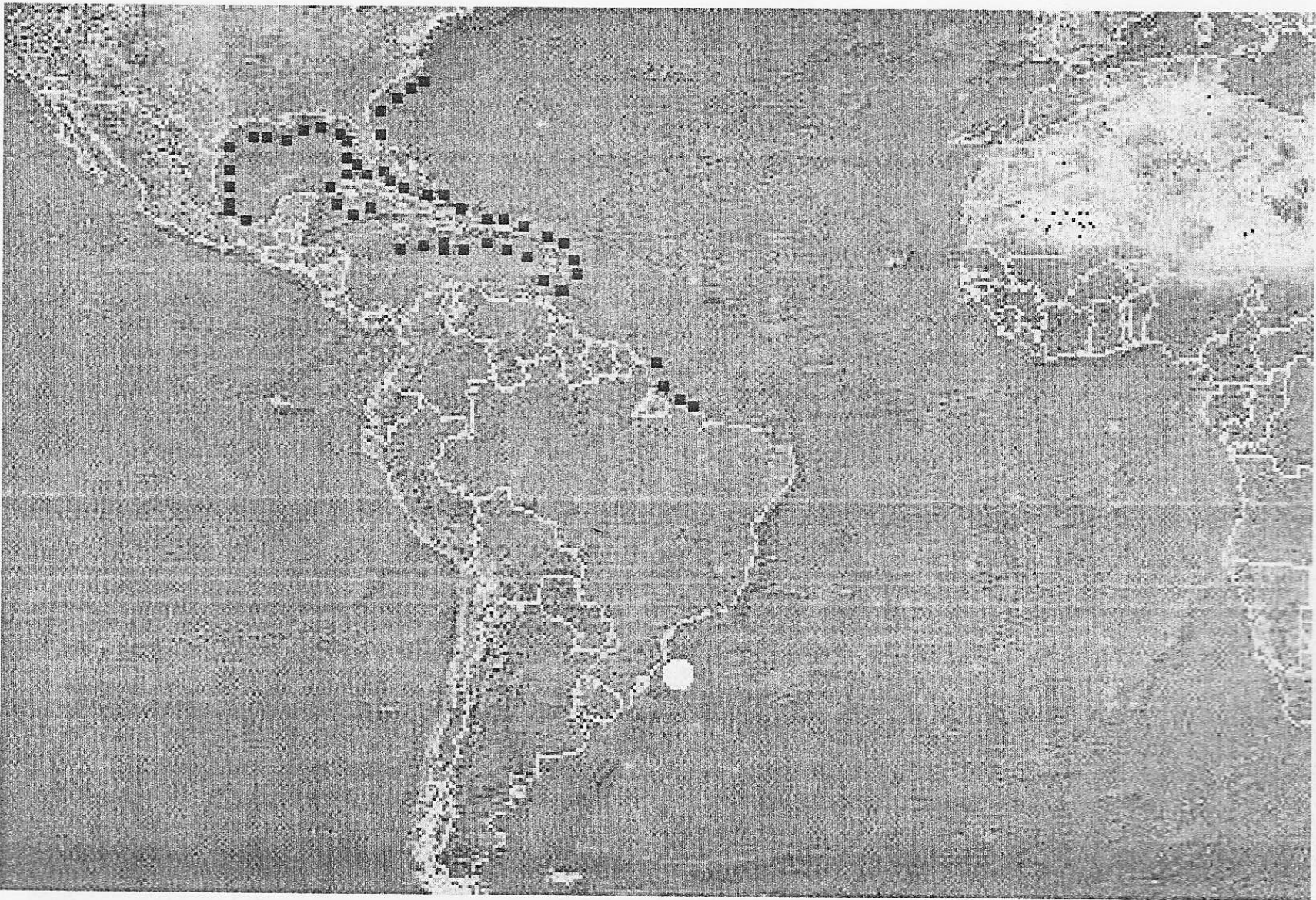


Figure 6: *Pylopagurus discoidalis* Pv.D.- Western Atlantic: North Carolina to Florida, Gulf of Mexico, Antilles and Brazil (Amapá and Pará). Pt.D.- Santa Catarina





Figure 7: *Oncopagurus gracilis* Pv.D.- Western Atlantic: Florida and Brazil (Pernambuco and Alagoas). Eastern Atlantic: Gulf of Guinea. Pt.D.- Santa Catarina and Rio Grande do Sul.

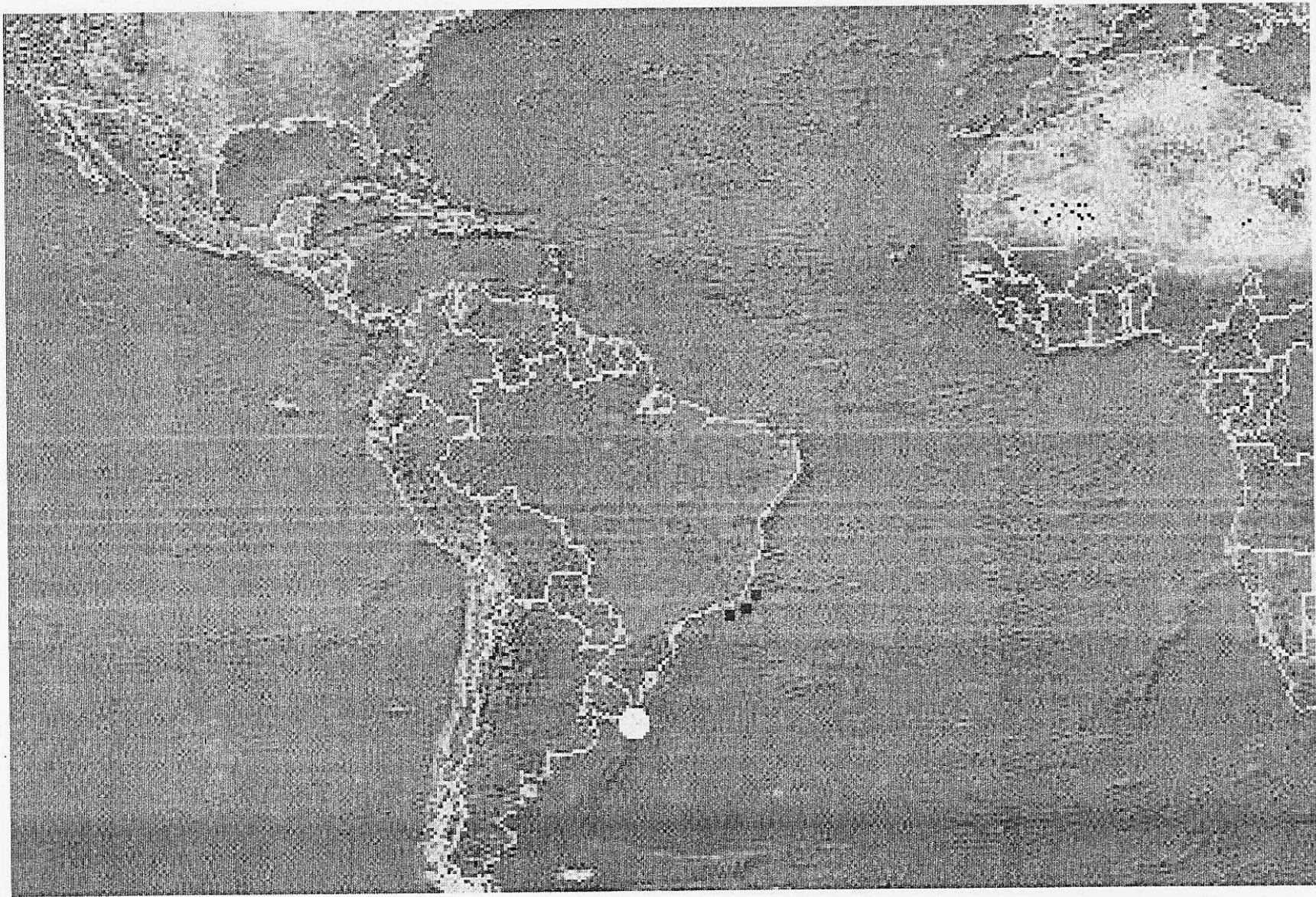


Figure 8: *Paguristes iris* Pv.D.- Western Atlantic: Brazil (Rio de Janeiro). Pt.D.- Uruguai.



## Acknowledgements

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We are grateful to CNPq for fellowships, and to Drs. João M. M. Nogueira and Janet W. Reid for revision of the manuscript, to Drs. Nilton José Hebling and Rafael Lemaitre for helpful comments and improvements to the manuscript.

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Received: 15<sup>th</sup> / 12 / 2000

Approved: 15<sup>th</sup> / 12 / 2001