

# B O C A G I A N A

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**REPORT ON A SHORE COLLECTING TRIP TO THE AZORES  
(12 SEPTEMBER - 1 NOVEMBER 1979),  
INCLUDING A LIST OF COLLECTING STATIONS.**

**CANCAP-PROJECT. CONTRIBUTIONS TO THE ZOOLOGY, BOTANY  
AND PALEONTOLOGY OF THE CANARIAN — CAPE VERDEAN REGION  
OF THE NORTH ATLANTIC OCEAN, No. 17**

By J. C. den Hartog & M. S. S. Lavaleye \*

With 6 plates and 2 figures

## INTRODUCTION

In the scope of taxonomical and zoogeographical studies of the marine fauna of the south-eastern North Atlantic, the «Rijksmuseum van Natuurlijke Historie» (RMNH) at Leiden, the Netherlands, carries out a long term collecting program in the area concerned (CANCAP-project) \*\* (fig. 1), which was begun in 1976. Since 1977 two other Dutch institutes have been participating in this program, viz. the «Rijksherbarium» at Leiden (marine Algae) and the Geology department of the University of Groningen (actuo-paleontology).

The first CANCAP-expedition (1976) was undertaken with an adapted minesweeper (HNLMS «Onversaagd»), but from 1977 on a modern oceanographic vessel, HNLMS «Tydeman», has formed the backbone of the CANCAP-project.

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\* (Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands)

\*\* Information and data concerning this project are filed in the CANCAP.archive (address: CANCAP.archive, c/o Rijksmuseum van Natuurlijke Historie, Postbus 9517, 2300 RA Leiden, The Netherlands).

The depths of sampling range from the deep-sea (down to a depth of ca. 4000 m) to -and including- the intertidal zone of the Macaronesian islands (Madeira Archipelago, Salvages, Azores, Canaries and Cape Verde Islands) and the coast of western North Africa.

In addition to the annual operations and activities with and from the «Tydeman», selective shore-collecting is regularly done by individual specialists or parties; for practical reasons generally immediately preceding or after the factual CANCAP-expeditions.

Up to 1979 the CANCAP-project had been focussed on Madeira, the Salvages and the Canary Islands (CANCAP-cruises I, II, III). The Azores had not yet been visited. Therefore, when it appeared that the «Tydeman» would not be available in 1979, we planned and carried out a modest shore-collecting trip to these islands, partly meant as a reconnaissance for the CANCAP V-expedition, planned for 1981 (In 1980 Madeira, the Salvages and the Canaries were visited again; CANCAP-IV). The specific aim of our trip was the collecting of Anthozoa (J. C. den Hartog) and marine Mollusca (M. S. S. Lavaleye); this on behalf of our current research. It was further aimed to make bird observations, especially of migratory birds (den Hartog & Lavaleye, 1981).

The Azores are an isolated group of nine widely separated islands (fig. 2), which can be divided into three more or less distinct groups: an eastern group (Santa Maria, São Miguel), a central group (Terceira, Graciosa, São Jorge, Faial, Pico) and a western group (Flores, Corvo). Notwithstanding the fact that the islands are influenced by the Gulf Stream (see e.g. Briggs, 1974: 207-208), they show a much closer overall resemblance with the Mediterranean and the Lusitanian-Mauritanian region — though being less rich in species — than with the U.S. east coast, Bermuda and the Caribbean. The degree of endemism is low, though detailed studies of the invertebrate fauna might reveal it to be higher than is generally assumed. This low degree of endemism is usually explained by the assumption that the present fauna is very young, having resulted from a repopulation of the islands during the post-glacial period, i. e. during the last 10,000 - 12,000 years (Briggs, 1974: 208; Zibrowius, 1980: 226-227); in terms of evolution a very short period. There are also no data suggesting a faunistic divergence between the various islands, although, considering the distance between them, such a divergence would not be unexpected. We therefore — and for the sake of representative sampling — took care to collect material in all three island groups mentioned above.

## RESULTS

Altogether six islands were visited, resulting in the sampling of 40 stations: Santa Maria, 8 stations; São Miguel, 12 stations; Terceira, 7 stations; Faial, 5 stations; Pico, 4 stations; Flores, 4 stations) (cf. fig. 2).

The following list gives an overall impression of the collections made (the numbers roughly indicate the total number of species and the number of stations where representatives of the various taxa were collected):

|                  |                |               |                |
|------------------|----------------|---------------|----------------|
| Foraminifera     | 4 or more; 8   | Pycnogonida   | 1; 1           |
| Porifera         | 5 or more; 16  | Acarina       | 2 or more; 2   |
| Hydrozoa         | 3 or more; 8   | Ostracoda     | 2 or more; 6   |
| Scleractinia     | 1; 1           | Copepoda      | 1 or more; 2   |
| Corallimorpharia | 1; 3           | Cirripedia    | 3 or more; 16  |
| Actiniaria       | 10; 29         | Decapoda.     | 20 or more; 32 |
| Stolonifera      | 1; 7           | Mysidacea     | 1; 1           |
| Plathelminthes   | 3 or more; 5   | Isopoda       | 5 or more; 19  |
| Nemertini        | 2 or more; 8   | Amphipoda     | 3 or more; 16  |
| Nematoda         | 1 or more; 1   | Ectoprocta    | 3 or more; 8   |
| Polychaeta       | 7 or more; 26  | Crinoidea     | 1; 3           |
| Sipunculoidea    | 1 or more; 10  | Asteroidea    | 4; 18          |
| Placophora       | 3 or more; 22  | Ophiuroidea   | 3 or more; 19  |
| Prosobranchia    | 70 or more; 37 | Echinoidea    | 5 or more; 26  |
| Opisthobranchia  | 28 or more; 24 | Holothuroidea | 4 or more; 20  |
| Pulmonata        | 6; 13          | Enteropneusta | 1; 2           |
| Bivalvia         | 28 or more; 28 | Tunicata      | 8 or more; 11  |
| Cephalopoda      | 2; 22          | Pisces        | 10 or more; 20 |

#### LIST OF COLLECTING STATIONS

(cf. fig. 2 and pls. I-VI; numbers in the figure and in the plates are station numbers)

- sta. 1. Santa Maria, south coast, Baía da Praia, 36° 57' N, 25° 06' W. Rocky flat with tidal pools, on both sides bordered by sandy beach, covering of algae insignificant; shore-collecting, 13-ix-1979.
- sta. 2. Santa Maria, south coast, Baía da Praia, 36° 57' N, 25° 06' W. Exposed shore with boulders (just east of sta. 1 & 4); shore-collecting, 13-ix-1979.
- sta. 3. Santa Maria, south coast, Baía da Praia, 36° 57' N, 25° 06' W. Rocky flat with tide-pools, west of sandy beach (= sta. 4), covering of algae insignificant except for *Enteromorpha* in some places; shore-collecting, 15-ix-1979.
- sta. 4. Santa Maria, south coast, Baía da Praia, 36° 57' N, 25° 06' W. Sandy beach with shells and driftwood; shore-collecting, 13-ix-1979.
- sta. 5. Santa Maria, east coast, Maia, 36° 57' N, 25° 01' W. Rocky flat with tide-pools, bare or with small algae; shore-collecting, 14-ix-1979.

- sta. 6. Santa Maria, south-east coast, Ponta do Castelo, Whaling-station, 36° 56' N, 25° 01' W. Rocky flat with tide-pools and boulders, covering of algae insignificant; shore-collecting, 15-ix-1979.
- sta. 7. Santa Maria, east coast, Baía de São Lourenço, 37° 00' N, 25° 03' W. Rocky flat with many holes and tide-pools, surrounded by sandy beach, significant algae-covering of a.o. *Sargassum* and *Fucus*; shore-collecting, 16-ix-1979.
- sta. 8. Santa Maria, north-west coast, north of airport, 37° 00' N, 25° 10' W. Rocky flat with tide-pools and coves with small boulder-beaches, surrounded by steep cliffs; shore-collecting, 12, 16-ix-1979.
- sta. 9. São Miguel, south coast, Vila Franca, 37° 43' N, 25° 26' W. Sandy polluted beach with rocks; shore-collecting, 19-ix-1979.
- sta. 10. São Miguel, south coast, between Caloura and Vila Franca, slightly east of Praia, 37° 43' N, 25° 28' W. Rocky shore with deep tide-pools; shore-collecting and snorkling, 19-ix-1979.
- sta. 11. São Miguel, south coast, Praia do Pópulo, 37° 45' N, 25° 36' W. Sandy beach; shore-collecting, 19, 20-ix-1979.
- sta. 12. São Miguel, west coast, Mosteiros 37° 53' N, 25° 50' W. Fish-auction; 20-ix-1979. (Not figured in the plates).
- sta. 13. São Miguel, west coast, Ponta dos Mosteiros, 37° 54' N, 25° 50' W. Protected basin surrounded by rocks, shallow parts with numerous stones and boulders; shore-collecting and snorkling (0-3 m), 20, 25-ix-1979.
- sta. 14. São Miguel, north coast, Maia, 37° 53' N, 25° 23' W. Natural harbour protected on the north side by a rocky flat and bordered on the south and west side by boulder-beaches, bottom of bay sandy with rocks and boulders; shore-collecting and snorkling (along the inner border of the rocky flat), 21, 26-ix-1979.
- sta. 15. São Miguel, south coast, Ponta Delgada, immediatly west of the harbour, 37° 44' N, 25° 41' W. Rocky shore with tide-pools large boulders and gravel, in the civinity of small concrete bathing pool; shore-collecting, 22-ix, 29-x-1979.
- sta. 16. São Miguel, south coast, slightly east of Ponta Delgada, Ponta de Rosto do Cão, 37° 44' N, 25° 38' W. Rocky shore with tide-pools and large basin, protected by barrier with some narrow inlets, bottom with sand, rocky ledges, stones and boulders; shore-collecting and snorkling, 23-ix-1979.
- sta. 17. São Miguel, south coast, east of Praia do Pópulo, in front of local church, 37° 45' N, 25° 36' W. Rocky flat with large tide-

- pools with rather few loose stones and boulders; shore-collecting and snorkling, 24-ix-1979.
- sta. 18. São Miguel, north coast, Ponta de Santa Bárbara, down trail along steep cliff, 37° 53' N, 25° 43' W. Very exposed rocky shore with big rocks and mainly in the splash zone with boulders; shore-collecting in upper part of intertidal zone 24-ix-1979. (Not figured in the plates).
- sta. 19. São Miguel, south coast, Caloura, harbour, 37° 42' N, 25° 31' W. Rocky shore with gravel (on both sides of the slip-way); shore-collecting, 27-ix-1979.
- sta. 20. São Miguel, south coast, Ilhéu de Vila Franca, 37° 42' N, 25° 27' W. Submerged caldeira connected with the surrounding sea by one significant inlet and a few clefts, sandy bottom with stones, depth down to ca. 4 m; snorkling, 28-ix-1979.
- sta. 21. Terceira, east coast, Porto Martins, south side of bay, west of swimming pool, 38° 41' N, 27° 03' W. Rocky shore with loose stones, considerable growth of sponges and algae; shore-collecting, 30-ix-1979.
- sta. 22. Terceira, south coast, west of Angra do Heroísmo, between Baía de Vila Maria and São Mateus da Calheta, 38° 39' N, 27° 15' W. Rocky shore with large protected pool and several smaller pools, all connected with the sea by crevices, considerable growth of algae; shore-collecting, 1-x-1979.
- sta. 23. Terceira, west coast, Ponta do Queimado, in front of the lighthouse (farol), 38° 46' N, 27° 23' W. Extremely exposed steep rocky coast with some rockpools at about 10 m above sealevel, with in- and outflow of splashwater; collecting mainly in these pools, 2-x-1979.
- sta. 24a. Terceira, east coast, Praia da Vitória, southern part of northern beach, 38° 43' N, 27° 04' W. Sandy beach; shore-collecting, 2-x-1979.
- sta. 24b. Same locality. Agglomeration of loose stones and boulders situated on the protected side of jetty; shore-collecting, 2-x-1979.
- sta. 25a. Terceira, Praia da Vitória, southern part of southern beach, 38° 42' N, 27° 03' W. Sandy beach with shell gravel; shore-collecting, 2, 4, 6-x-1979.
- sta. 25b. Same locality. Rocky shore with loose stones, boulders, sand and tide-pools (just north of Forte de Santa Catarina); shore-collecting, 2, 4, 6-x-1979.
- sta. 26. Terceira, south coast, west of Angra do Heroísmo, Porto Negro, eastside of little bay, 38° 39' N, 27° 16' W. Rocky shore with tide-pools, loose stones, boulders, some muddy sediment and considerable growth of algae; shore-collecting 3-x-1979.

- sta. 27. Terceira, east coast, between Porto Novo and Porto de São Fernando, 38° 41' N, 27° 04' W. Rocky shore with deep tide-pools with sand, stones, and boulders, considerable growth of algae especially on exposed side of the rocks; shore-collecting and snorkling, 5-x-1979.
- sta. 28. Faial, south-west coast, Varadouro, 38° 34' N, 28° 46' W. Basaltic rocks surrounding concrete swimming pool; shore-collecting, 7-ix-1979.
- sta. 29. Faial, south coast, Horta, westside of Porto Pim, 38° 31' N, 28° 38' W. Sandy bottom with rocks, stones and boulders; shore-collecting, 8-x-1979.
- sta. 30. Faial, Fajã, Praia do Norte, 38° 37' N, 28° 45' W. Sandy beach with a. o. drift-wood; shore-collecting, 7, 9, 18-x-1979.
- sta. 31. Faial, south coast, Horta, just west of Porto Pim, 38° 31' N, 28° 38' W. Rocky shore with stones, boulders and chiefly subtidally with sand; shore-collecting and snorkling till ca. 3 m, 9-x-1979.
- sta. 32. Faial, east coast, Horta, seafront inside harbour, 38° 32' N, 28° 38' W. Sandy bottom with rocks and stones, depth to ca. 6 m; snorkling, 10, 11-x-1979.
- sta. 33. Pico, south coast, Lages, harbour, 38° 24' N, 28° 15' W. Large rocky tidal flat and protected bay (harbour) with sand, loose, rocks, boulders and stones (often cemented together by sponges); shore-collecting, 13-x-1979 and snorkling (mainly in very shallow water), 13, 15-x-1979.
- sta. 34. Pico, south coast just south-west of Lages, 38° 23' N, 28° 15' W. Tide-pools in rocky marsh protected by agglomerations of large boulders; shore-collecting; 14, 17-x-1979.
- sta. 35. Pico, north coast, Cais do Pico, 38° 31' N, 28° 19' W. Rocky shore with pools (almost without loose stones) on both sides of the slipway of the whaling factory; shore-collecting, 16-x-1979.
- sta. 36. Pico, north coast, Cais do Pico 38° 31' N, 28° 19' W. Rocky shore with deep tide-pools opposite landing-stage in front of fish-market, considerable growth of algae, especially *Coralina*; shore-collecting and snorkling (0-2 m), 16-x-1979.
- sta. 37a. Flores, south-east coast, Porto das Lajes, 39° 23' N, 31° 10' W. Exposed rocky barrier with, deep more or less protected tide-pools, bottom with boulders and coarse sand, considerable growth of algae; shore-collecting and snorkling, 19, 20, 23, 25-x-1979.
- sta. 37b. Same locality, harbour just north of harbour-pier. Bottom with stones and boulders, depth ca. 4-6 m; snorkling, 23-x-1979.

- sta. 38. Flores, west coast, Porto da Fajã Grande, 39° 28' N, 31° 15' W. Boulder beach with drift-material, principally *Sargassum*; shore-collecting, 21, 22-x-1979.
- sta. 39a. Flores, east coast, Santa Cruz, harbour, 39° 27' N, 31° 07' W. Bottom with stones and boulders, the surrounding rocks and quay-wall with crevices and holes, depth down to ca. 6 m; snorkling, 21-x-1979.
- sta. 39b. Same locality, just north of harbour. Rocky shore with tide-pools and boulder beach, rather polluted, considerable growth of algae and Vermetidae (Mollusca); shore-collecting, 21, 24-x-1979.
- sta. 40. Flores, west coast, Porto da Fajã Grande, Ponta do Baixio, 39° 27' N, 31° 16' W. Large exposed inlet with turbulent water, bottom with loose stones and boulders; snorkling (1.5-3 m), 22, 23-x-1979.

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The figures in this paper were drawn by Mr. J. J. A. M. Wessendorp (RMNH).

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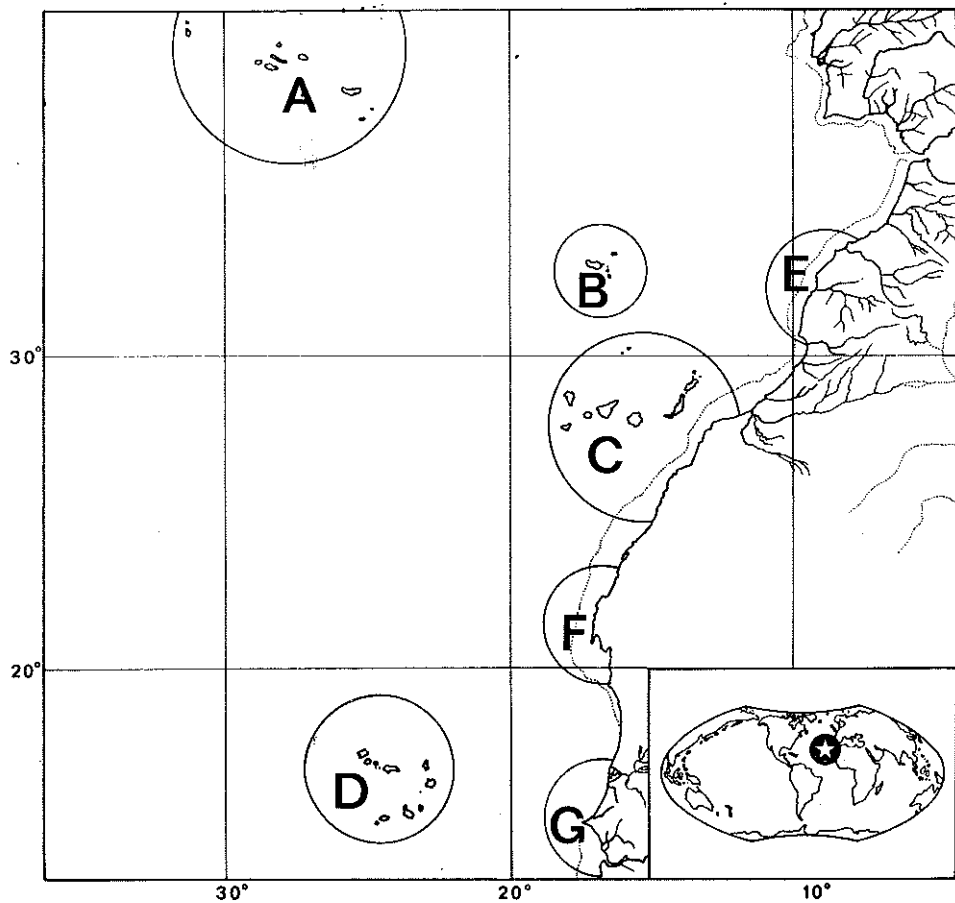


Fig. 1. — Outline map of the CANCAP-project; areas of investigation encircled. A. Azores; B. Madeira Archipelago; C. Canary Islands and Salvages; D. Cape Verde Islands; E. Morocco; F. Mauritania; G. Cape Verde region (Senegal, Gambia, Guinea-Bissau).



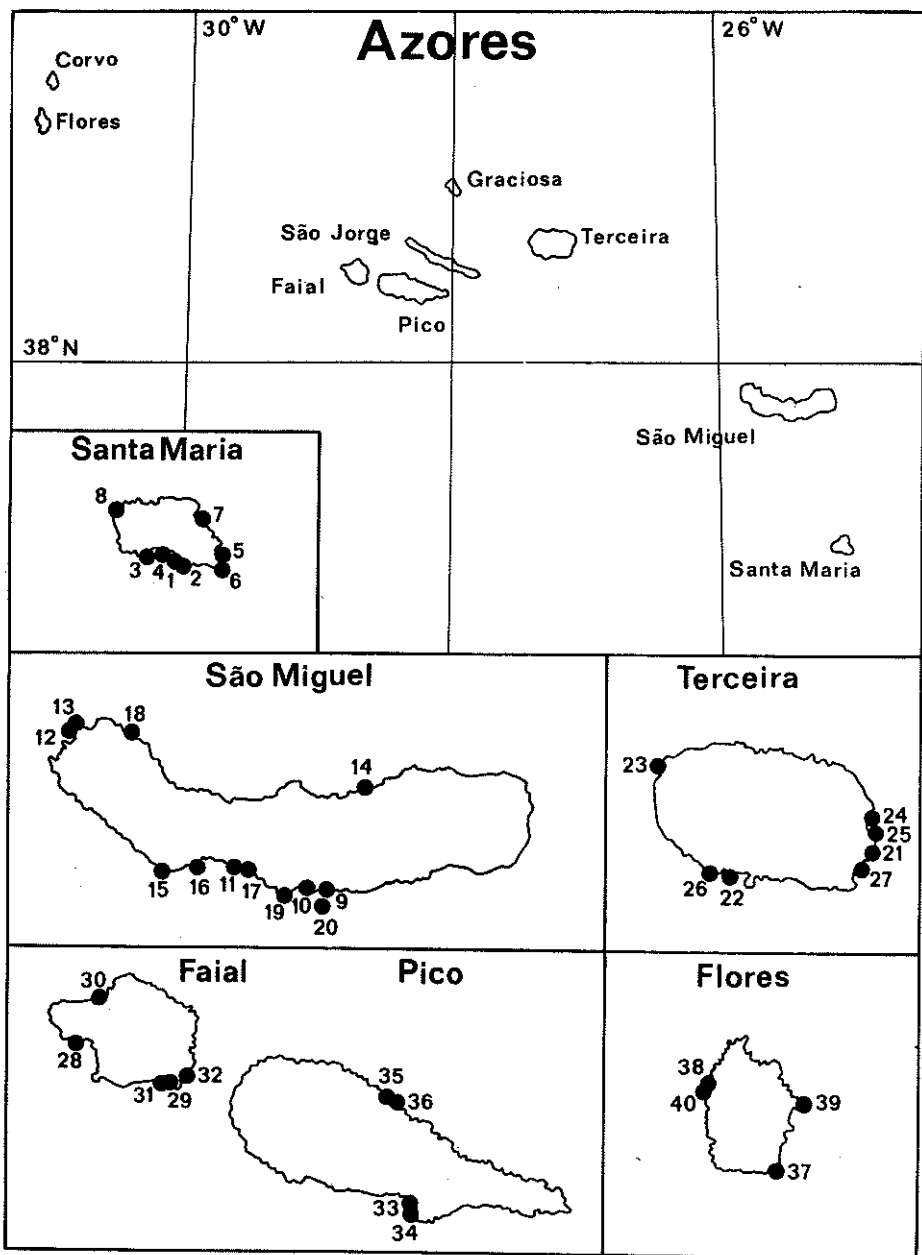
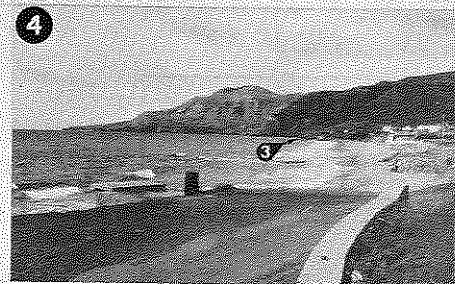
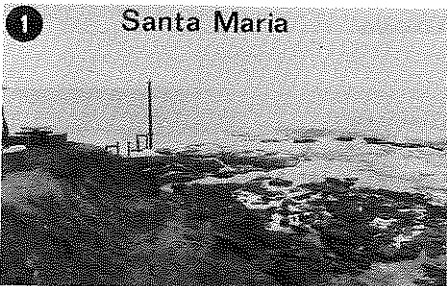
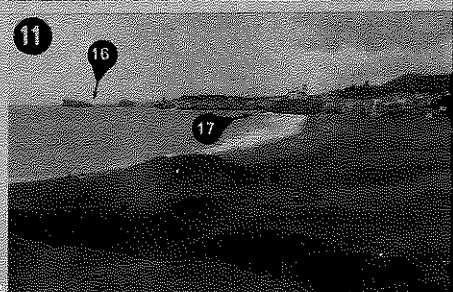
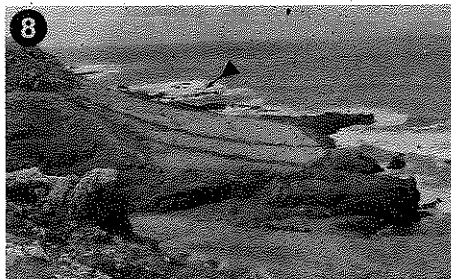
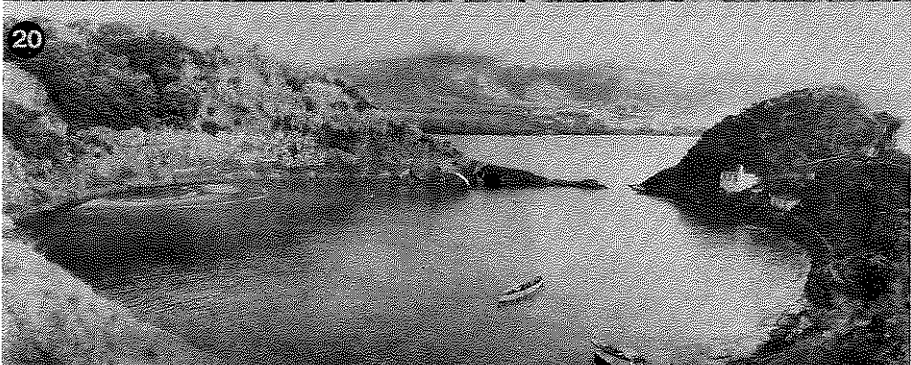
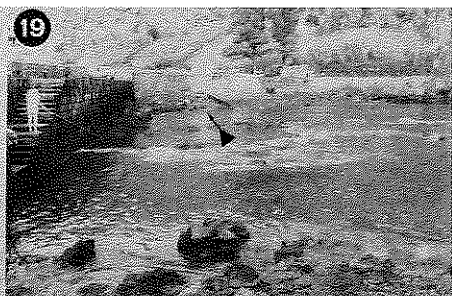
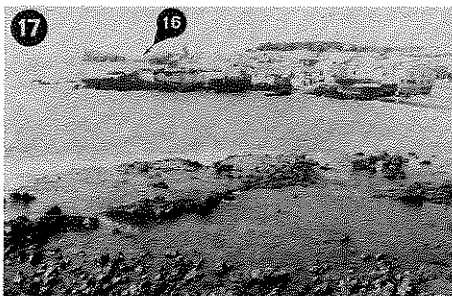
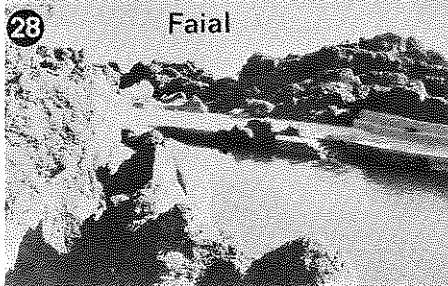
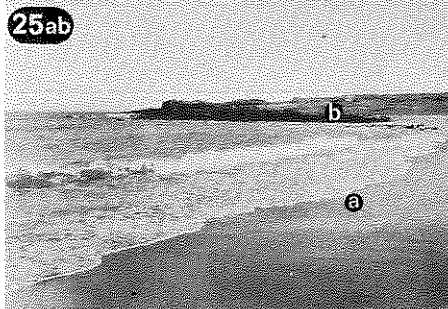
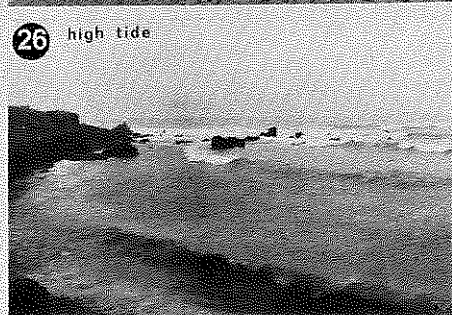
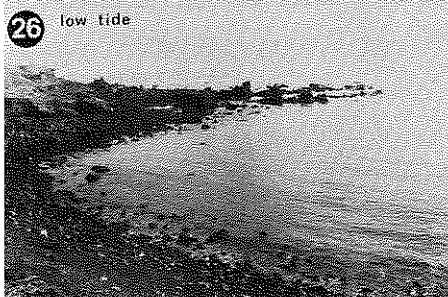
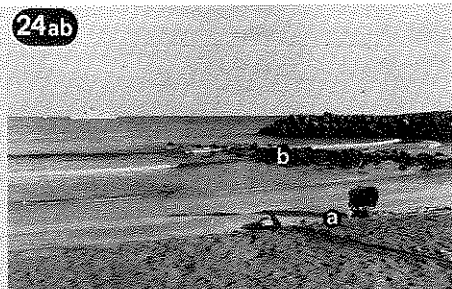


Fig. 2. — Outline map of the Azores (scale 1 : 5,000 000) and survey of the collecting stations (scale 1 : 1,000 000); numbers are station numbers.













37a

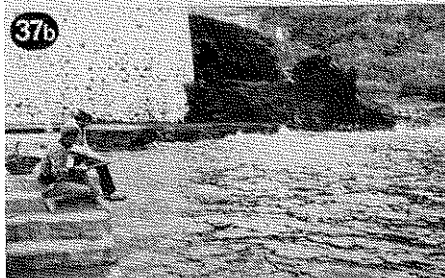
Flores



37b



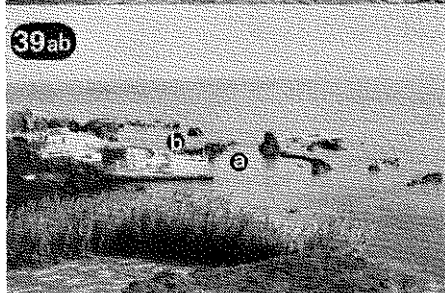
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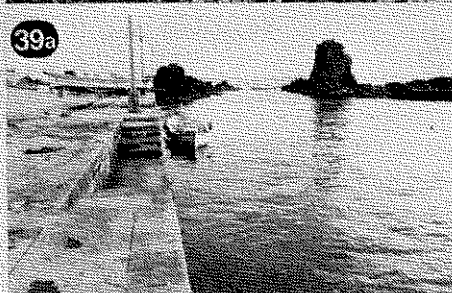
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39a



39b



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