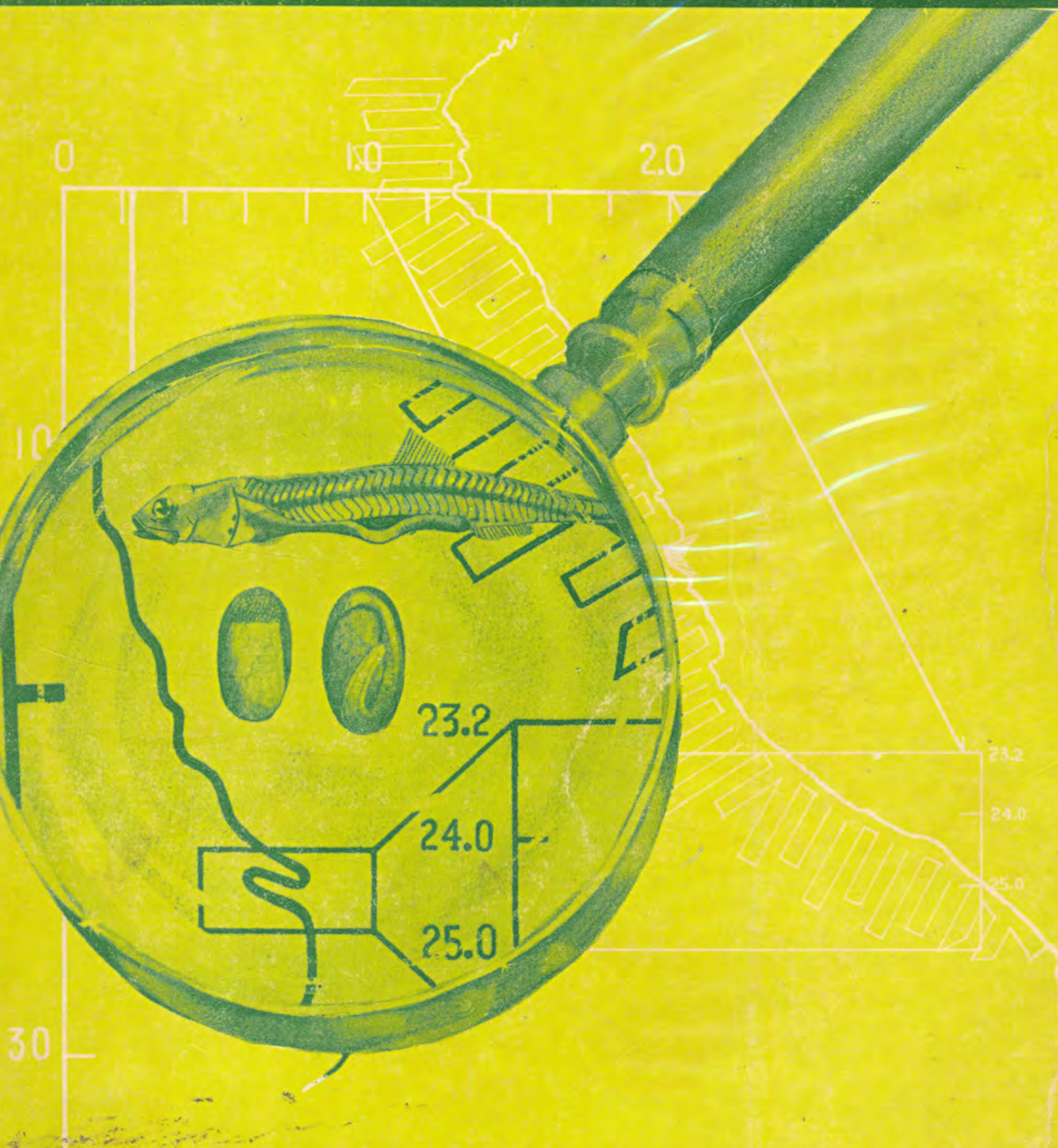




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**INVESTIGACION COOPERATIVA DE LA ANCHOVETA
Y SU ECOSISTEMA - ICANE - ENTRE PERU Y CANADA
CALLAO 1981 PERU**

OBSERVATIONS OF FLYING-FISH (EXOCOETIDAE) BETWEEN NORTHERN PERU AND PANAMA, OCTOBER-DECEMBER 1977.

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ABSTRACT

Counts of flying-fish observed during the cruise of CSS BAFFIN between Panama and northern Peru, October-December 1977, are reported. The fish were commonest in the very warm waters between the Equator and Panama, and were not seen at all in waters cooler than c. 19°C.

RESUMEN

Se informa sobre los conteos de peces voladores observados en el crucero del CSS BAFFIN en octubre-diciembre 1977 entre Panamá y el Norte del Perú. Las observaciones más abundantes fueron en las aguas cálidas entre la línea ecuatorial y Panamá y nulas completamente en aguas de menos de 19°C.

INTRODUCTION

Flying-fishes Exocoetidae are well known for their habit of leaping from the water ahead of ships and 'flying' away, sometimes for distances of 0.5 km or more. This 'flight' is actually a glide, in which the fishes' spread, enlarged pectoral and pelvic fins are used as wings and beats of their tails at the sea surface provide the propulsion. This habit makes it easy to make quantitative surveys of the Exocoetidae as a group, though it is rarely possible to identify individual species (e.g. Bailey, 1966; Brown, 1977; Plomley, 1968; Shuntov, 1968).

This paper summarises counts of flying-fish made between 30 Oct. and 8 Dec., 1977 during the cruise of CSS BAFFIN in northern Peruvian waters, and on the voyages between the survey area and Panama. The complete data have been deposited with the Instituto del Mar del Perú (IMARPE) and with the Canadian Wildlife Service.

METHODS

Flying-fish were counted in the course of standard 10-minute watches for seabirds (Brown et al, 1975b; Brown, in press), when the ship was steaming at over 4 kt (c.2 m/s) and usually at 12 kt (c.6 m/s). The observer stood on one wing of the flying-bridge, c 15 m above the sea, and

counted the number of fish 'flying' away from the bow wave on one side of the ship. No attempt was made to follow Plomley's (1968) system of controlled, alternate observations between the two sides of the ship.

Figure 1 plots the average numbers seen per 10-minute watch north of 05°00'S, where flying-fish were commonest. The averages refer to each 15'S (or N) x 15'W 'block' visited by the ship; data from the return trip to Panama in December are in parentheses. (Note that '0' indicates an absence of fish; a blank indicates that the 'block' in question was not visited.) With one exception (the 'block' 01°15'S x 81°00'W: 6 watches) these averages are based on 5 watches or less.

Sea surface temperatures (°C: Fig. 2) were taken from the ship's log. They were measured with a standard mercury thermometer and meteorological bucket. The figure shows the temperatures for each 'block'; where more than one temperature was recorded in a 'block' an average is given.

SPECIES IDENTIFICATION

Chirichigno (1974) lists 11 species of flying-fish occurring off Perú and in adjacent Ecuadorean waters: *Fodiator acutus*, *Exocoetus monocirrhus*, *E. obtusirostris* and *E. volitans*, *Cypselurus*

callopterus, *Cheilopogon heterurus*, *C. xenopterus* and *C. dorsomaculata*, *Hirundichthys speculiger*, *H. marginatus* and *H. rondeletii*. It is likely that some at least of these species were among those recorded. Unfortunately the only specimen collected (at c.01°00'N 80°50'W on 1 Nov.) was not preserved; colour photographs indicate that it was c.30 cm long, steely blue above and white below, with greyish unspotted pectoral fins and long dark pelvics - both with paler margins - a small dark spot on the tip of the dorsal fin, and with unpigmented margins to the tail fin. Another form, commonly seen but not collected, had a golden sheen on its pectoral fins with a darker margin along the trailing edge; the white pelvics were fairly long and the tail white with black tips to its lobes. Most of the fish seen

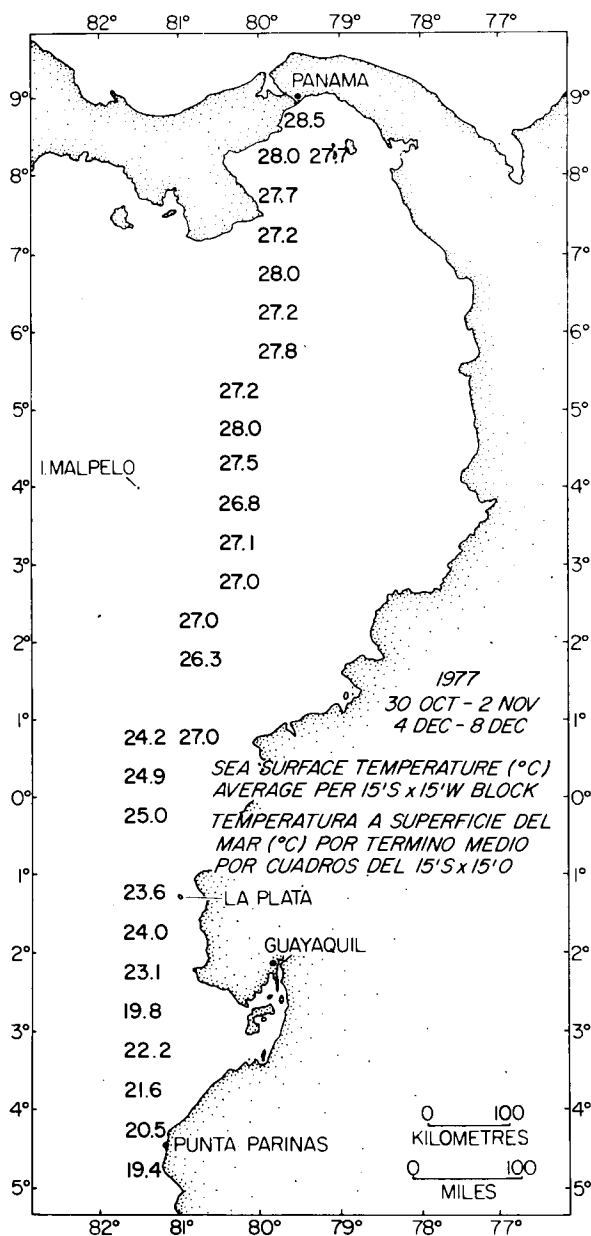
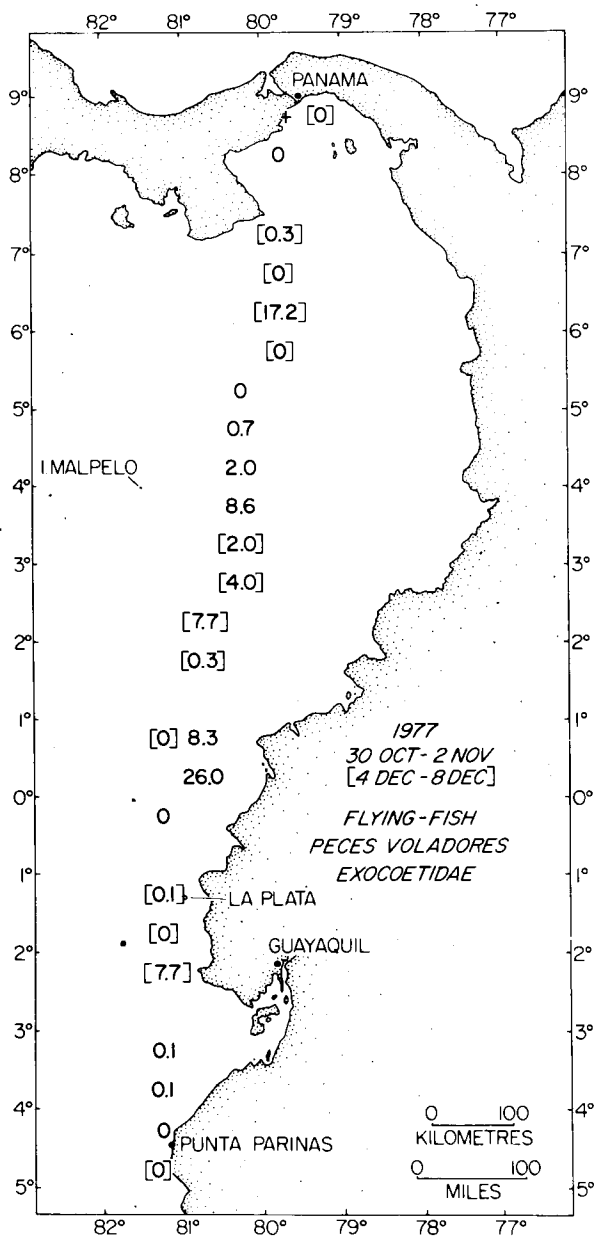
at sea had long pelvic fins, conspicuously spread. These characters suggest fish of the genera *Cypselurus*, *Cheilopogon* and *Hirundichthys*, with *Cheilopogon xenopterus* as a tentative identification of the collected specimen.

DISTRIBUTIONS

Figures 1 and 2 show that flying-fish were commonest in the very warm waters between the Equator and Panama. They were virtually absent in waters cooler than 21°C. The waters south of 05°00'S were almost always cooler than this, and flying-fish were recorded on only one day. On 28 Nov. a single flying-fish was seen in 2 watches in

Fig. 1 Flying-fish observations (see text)

Fig. 2 Sea surface temperatures during observation cruise.



the 'block' 11°15'S x 78°45'W, and 2 in 11°00'S x 79°00'W and 11°00'S x 79°30'W (3 watches in each case). The surface temperature was 19.6°C in the first 'block' and 21.5°C in the other two - a similar level to that found north of 05°00'S. Temperature limits at the southern end of the Peru Current are also similar. Flyingfish were seen only once during a late summer cruise off southern Chile, off Islas Juan Fernandez (c. 33°30'S 79°00'W) on 4 April 1970, at a water temperature of 19.4°C - almost the warmest of the entire cruise (Brown et al., 1975a. and unpublished). In another eastern boundary upwelling, the Senegal/Canary Current system off northwest Africa, *Exocoetus* and *Cypselurus* flying-fish occurred only in waters warmer than 19°-20°C (Brown, 1977).

The average 10-minute counts recorded in Fig. 1 were markedly lower than those off Senegal, where *Exocoetus* numbers often exceeded 30 fish

/10 minutes (Brown 1977). However, it would be unwise to make too much of this apparent difference, since virtually nothing is known of the conditions which stimulate 'flight' in flying-fish, the readiness of different species to 'fly' or the relationship between the numbers observed 'flying' and the numbers actually present below the surface.

ACKNOWLEDGMENTS

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