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Reproductive cycle of the holothurian *Holothuria scabra* in Saugi Island, Spermonde Archipelago, Southwest Sulawesi, Indonesia

by Dr Ambo Tuwo [1]

Introduction

Holothuria scabra is one of the 16 commercial holothurians harvested in Southwest Sulawesi (Tuwo & Conand, 1996). Its reproductive cycle has been studied at different sites, but there was confusion about its spawning periods. Some authors have described a semi-annual reproductive cycle or two spawning periods in a year (Ong Che &Gomez, 1985). The present research aims to study the reproductive cycle and to find explanations for the spawning period of *Holothuria scabra* in Sulawesi, Indonesia.

Methods

Specimens of *Holothuria scabra* were collected monthly during a year at Saugi Island, Spermonde Archipelago, South Sulawesi, Indonesia. Thirty specimens were collected from each sampling.

In the laboratory, the total length (TL), body-wall wet weight (BW) and gonad wet weight (GW) were measured. Gametogenesis was examined using histological observation. The individual maturity stage was determined according to the maturity stage of dominant tubules in the gonad. Percentages of different maturity stages were calculated for each sampling. Gonad indices (GI) were calculated using body-wall wet weight (BW) and gonad wet weight (GW):

$$GI = (GW \times 100)/BW$$

Results and discussion

Microscopically, characteristics for both sexes were similar to those of other holothurians (Tanaka, 1956; Tuwo & Conand, 1992). The maturing tubules contain the previtellogenic and vitellogenic oocytes in females (Figure 1A and 1B), and spermatocytes and spermatozoa in males (Figures 1E and 1F). The mature tubules contained only vitellogenic oocytes in females (Figure 1C) and only spermatozoa in males (Figure 1G). In spent tubules we observed the presence of relict oocytes in females (Figure 1D) and relict spermatozoa in males (Figure 1H).

Maturation (Stage III) was observed from July to March. Maturity (Stage IV) was present practically

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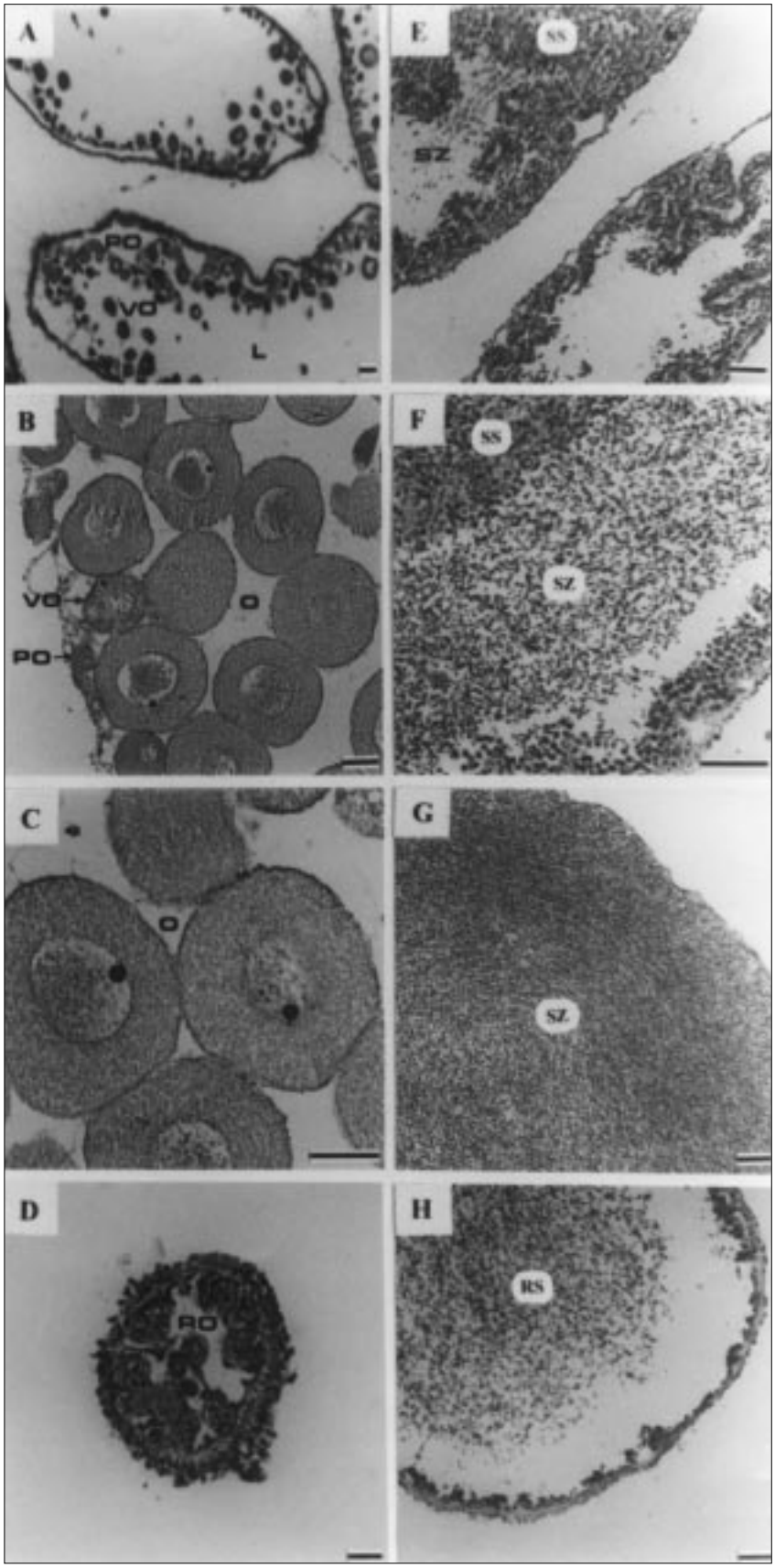

Figure 1

Microscopic characteristics of different maturity stages in the ovary and testis of *Holothuria scabra*. Stage III (early), (A) female, (E) male; stage III (late), (B) female, (F) male; stage IV, (C) female, (G) male; stage V, (D) female, (H) male. L, lumen; O, oocyte; PO, previtellogenic oocyte; RO, relic oocyte; RS, relic spermatozoa; SS, spermatocyte; SZ, spermatozoa; VO, vitellogenic oocyte

throughout the year (Figure 2). Post-spawning (Stage V) was accentuated in two periods. The first was at the beginning of dry season, from March to July, when the temperature increases. The second was at the beginning of the rainy season, from November to January, when the temperature decreases (Figure 3). Two phases of gonad evolution were distinguished. The first was a regular increase from June to October and from February to April. The second phase was a regular decrease from April to June and from October to February (Figure 4).

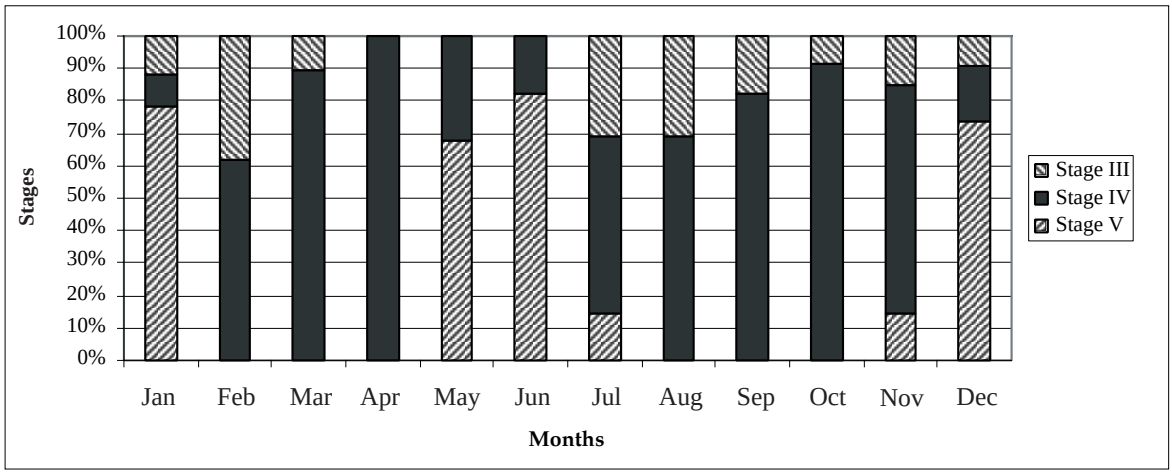

Figure 2
Monthly mean of the different stages of *Holothuria scabra*

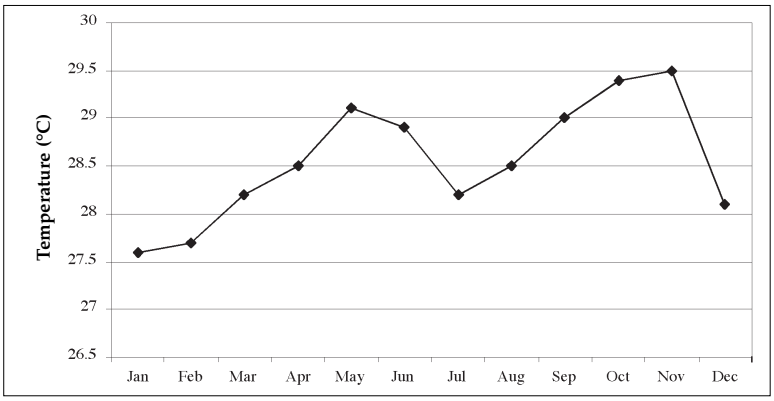

Figure 3
Monthly mean air temperature

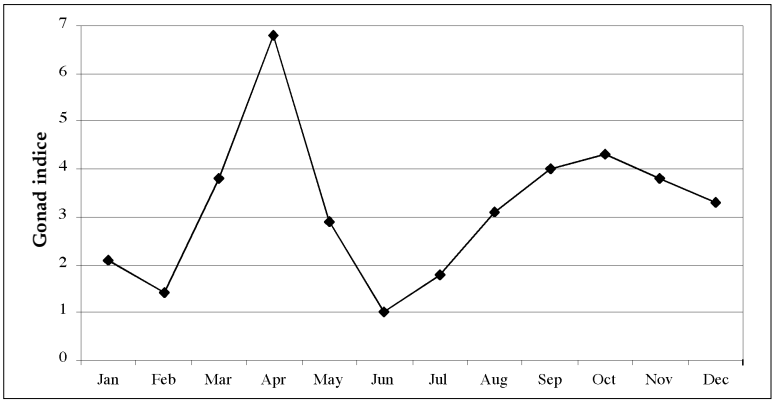

Figure 4
Monthly mean gonad index of *Holothuria scabra*

Holothuria scabra in Saugi Island had two spawning periods or a semi-annual reproductive cycle, as observed by Conand (1993) in the New Caledonia Lagoon.

In the maturation stage (stage III), an individual can have some mature tubules, so a small spawning concerning some mature tubules can occur at any time through the year, as observed by Ong Che and Gomez (1985) on Calatangan, Batangas, Philippines.

Conclusion

The *Holothuria scabra* population at Saugi Island has two spawning periods. Nevertheless some spawning from some mature tubules can be observed throughout the year.

Acknowledgement

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Asexual reproduction parameters and the influence of fission on a *Holothuria atra* sea cucumber population from a fringing reef on Reunion Island (Indian Ocean)

by S. Jaquemet, V. Rousset & C. Conand [1]

Introduction

Holothuria atra is one of the most common sea cucumbers of intertidal zones in the tropical Indian-Pacific region. Asexual reproduction through transverse fission is a biological phenomenon which has already been studied, most notably in the south of the island of Taiwan (Chao & Chang, 1989; Chao et al., 1994), on the reefs of New Caledonia (Conand, 1989) and on the Great Barrier Reef in Australia (Harriot, 1982; Uthicke, 1994; Uthicke, 1997).

On Reunion Island, *H. atra* can be found throughout the fringing reef of the St Gilles/La Saline reef system, where it varies in size from 10 to 30 cm and in weight from 10 to 220 g. It is usually located on substrata composed of sand and dead coral rubble. *H. atra* specimens divide into two parts (fission) at a point located about 45 per cent of the length of the body from the mouth (Conand & de Ridder, 1990; Conand 1996). Each part then regenerates, thereby giving rise to two new identical specimens. This phenomenon affects a significant percentage of the specimens of the population at the Planch'Alizés study site (between 11.4 and 35 per cent according to Boyer, Caillasson & Mairesse 1995; Conand 1996).

This study was conducted through biannual samplings in a 80 m^2 section marked out by permanent plot markers. The goal of the study was to monitor changes in the population over a period of four years (November 1993 to November 1997), for a variety of parameters (fission and regeneration rates, population density, specimen size), in order to determine the significance and effects of asexual reproduction through fission on this population.

There were two broad categories of specimens: normal specimens and those involved in asexual reproduction, which made it possible to classify specimens according to six different categories (Doty, 1977; Conand & de Ridder, 1990; Conand, 1996):

- 'N' (normal) specimens: showed no signs of asexual reproduction;
- 'F'(fission) specimens: showed signs of transverse division (i.e. constriction at a point 45% of the length of the body from anterior section);
- 'A' (anterior) specimens: had recently undergone fission and only had their anterior part;
- 'P' (posterior) specimens: had recently undergone fission and only had their posterior part;
- 'Ap' (Anterior–posterior) specimens: showed signs of regenerating their posterior part;
- 'Pa' (Posterior–anterior) specimens: showed signs of regenerating their anterior part;
- an 'S' category: included all specimens resulting from fission (F, A, P, Ap, Pa).

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