INTERSPECIFIC RELATION IN THE COLONY FORMATION AMONG SOME HYDROZOAN SPECIES

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INTERSPECIFIC RELATION IN THE COLONY FORMATION AMONG SOME HYDROZOAN SPECIES[1)]

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In the previous paper the writers reported on the distribution pattern of hydrozoan species on seaweed and the interspecific coaction among them was supposed when they develop their colonies, but further investigation both in the field and in the laboratory was necessary.

The writers were fortunate in their laboratory work on the said interspecific relation, because the rearing method of the hydrozoan colony had been already established by Hirai and Kakinuma (1957).

Interesting results were obtained in relation to the above mentioned coaction by the laboratory experiments done during the summer of 1960 in the Marine Biological Station and also in the Biological Institute of Tôhoku University as stated in the present paper.

MATERIALS AND METHOD

The hydrozoan species, *Bougainvillia* sp., *Clytia volubilis* and *Orthopyxis platycarpa* found on the seaweed from the tidal zone in the neighbourhood of the Marine Biological Station were used for the present investigation. The former belongs to Athecata but the latter two to Thecata.

A piece of the hydroid colony placed in a Petri-dish supplied with sea-water regenerated the new hydroid colony. Here, the sea-water was renewed every day and as food the larvae of the brine shrimp were supplied sufficiently.

1) Contributions from the Marine Biological Station of Asamushi, Aomori-ken No. 289.

RESULTS AND DISCUSSION

I. Colony formation of each hydrozoan species.

A piece of the hydroid colony of each species set on the bottom of a Petri-dish regenerated radially several new hydrorhiza accompanied with hydropolyps and thus the growing hydrorhiza become anastomosed upon each other and the luxuriant hydroid colony develops to fill up the dish.

But when two pieces from respective colonies of two species coexist in a Petri-dish, one of them becomes weak in activity though the other grows normally.

II. Relation between *Bougainvillia* sp. and *Orthopyxis platycarpa*.

Two pieces from the respective colonies of *Bougainvillia* and *Orthopyxis* and set apart in a Petri-dish start to regenerate their own new hydroid colonies, but in the course of time *Orthopyxis* is inclined to decrease its growth rate and at last stops colony development. On the other hand the *Bougainvillia* colony normally develops independently of the above, though the part adjoining the *Orthopyxis* colony seems to become slightly weak in growth (Pl. I, Figs. 1–8).

The growing mode of the colony mentioned above is schematically shown in Fig. 1.

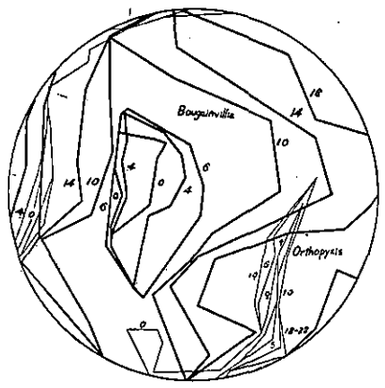


Fig. 1. Schema showing the successive growth in the colonies of *Bougainvillia* sp. and *Orthopyxis platycarpa*. Numerals show the number of days after setting of the two species.

III. Relation between *Bougainvillia* sp. and *Clytia volubilis*.

As shown in Pl. II, Figs. 9–16 and in the schema (Fig. 2) the growth of *Bougainvillia* dominates over that of *Clytia*. As is clearly recognized in Fig. 2 immediately after coming into contact with the *Bougainvillia* colony there can be little growth in the *Clytia* colony.

The successive changes in the distribution pattern of hydroid polyps in the

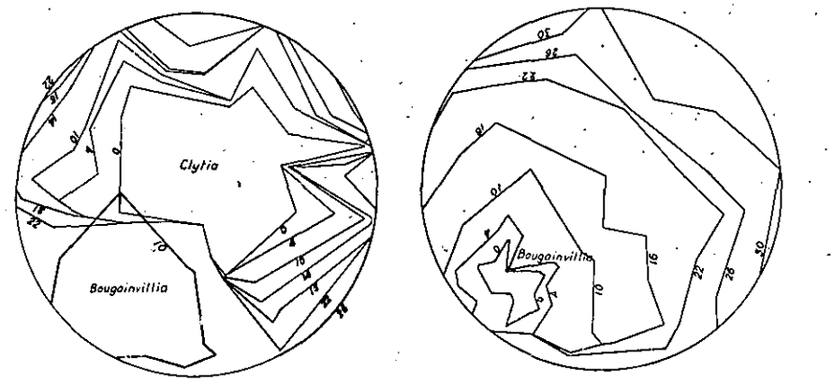


Fig. 2. Schemata showing the successive change in the extent of the colonies of *Bougainvillia* sp. (right) and *Clytia volubilis* (left), Numerals show the number of days after setting of the two species.

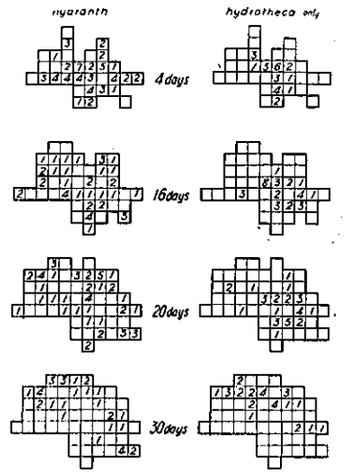


Fig. 3. Changes in the extent of the colony of *Clytia volubilis* and the numerical distribution of hydranth and degenerated hydranth in the course of time. Number of days shows the days after setting of the two species.

subordinate hydroid colony, *Clytia volubilis*, are shown in Fig. 3. Here, it must be noticed that at the beginning of the experiment the active polyps are rather numerous in the central portion of the colony, but in the course of time they become restricted on the peripheral portion of the colony and moreover decrease in number. Relating to this it is also interesting that the degenerated polyps,

empty hydrotheca, appears firstly in the central portion of the colony and with the elapse of time increase in number extending toward the peripheral portion.

These phenomena indicate that by the existence of the dominator the subordinate hydrozoan colony is not only weakened in its growth but also declines in its activity firstly in the central old portion of the colony and with the progress of time this declined portion extends toward the pripheral portion and thus the activity is restricted at the extreme periphery. If so, it should be expected that by removing the *Bougainvillia* colony the declined *Clytia* colony would regains its activity.

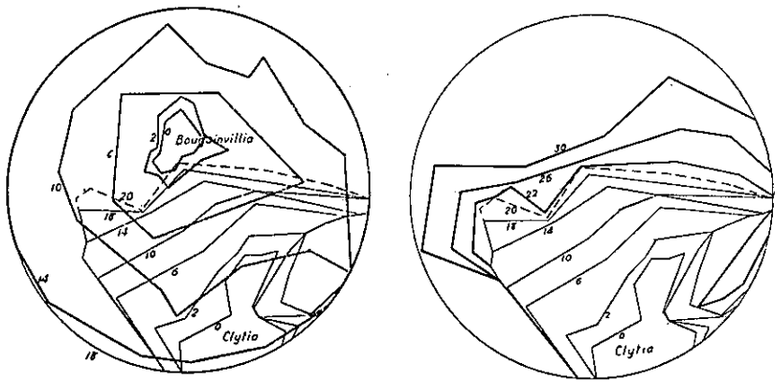


Fig 4. Schemata showing the successive change in the extent of the colonies of *Bougainvillia* sp. (left) and *Clytia volubilis* (left and right). In the right, the extent of the *Clytia* colony after removing *Bougainvillia* is shown with thick lines.

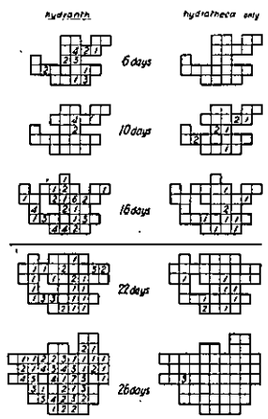


Fig. 5. The same as in Fig. 3. After twenty days the *Bougainvillia* colony was removed.

From the above assumption, after the *Bougainvillia* colony dominated the *Clytia* colony (Pl. III, Figs. 17–23) the former colony was removed.

From this treatment, it was clearly recognized that the remaining *Clytia* colony recovered its activity and began to develop strongly as shown in Pl. III, Figs. 24–26. These are shown schematically in Fig. 4.

It is also interesting that as shown in Fig. 5 the hydranth increases again in number and the empty hydrotheca disappear soon after removal of the *Bougainvillia* colony.

These phenomena show evidently that by removing the *Bougainvillia* colony *Clytia* renews its ordinary activity in the whole portion of the colony, not only in the portion of the peripheral hydrorhiza.

CONCLUSION

As mentioned above the so-called interspecific coaction was observed during the development of the hydroid colony between *Bougainvillia* sp. and each of *Clytia volubilis* and *Orthopyxis platycarpa*.

Here, *Bougainvillia* sp. dominates over each of *Clytia* and *Orthopyxis*. That is, the hydroid colony of each of *Clytia* and *Orthopyxis* is inactivated by the existence of the *Bougainvillia* colony and after removing the latter the former regains its activity.

But, the mechanism in the above mentioned interspecific coaction remains unclarified and seems to be in need of further investigation.

LITERATURE CITED

HIRAI, E. and Y. KAKINUMA, 1957. Developmental cycle of *Cladonema radiatum* var. *mayeri* Perkings reared in the laboratory. Bull. Mar. Biol. Sta. Asamushi, 8 : 49–54.

KATÔ, M., K. NAKAMURA, E. HIRAKI and Y. KAKINUMA, 1961. The distribution pattern of hydrozoa on seaweed with some notes on the so-called coaction among hydrozoan species. Ibid., 10 : 195–202.

PLATE I.

Successive growth in the colonies of *Bougainvillia* sp. and *Orthopyxis platycarpa*. The number of days shows the days after setting of the two species.

PLATE II.

Successive growth in the colonies of *Bougainvillia* sp. and *Clytia volubilis*.

PLATE III.

Successive growth in the colonies of *Bougainvillia* sp. and *Clytia volubilis*. The last three show the growth in the *Clytia* colony after removing the *Bougainvillia* Colony.

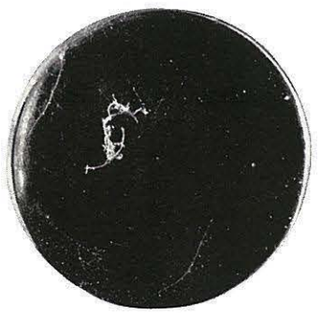


Fig. 1 0 days

Fig. 2 4 days

Fig. 3 6 days

Fig. 4 10 days

Fig. 5 14 days

Fig. 6 18 days

Fig. 7 22 days

Fig. 8 26 days

Fig. 9

Fig. 10

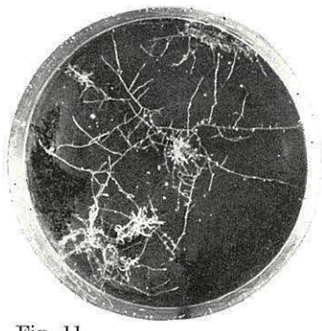
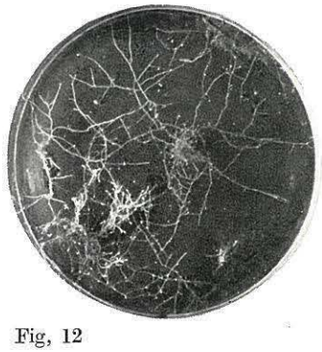


Fig. 11



Fig, 12

Fig. 13

Fig. 14

Fig. 15

Fig. 16

Fig. 17 [illegible] 0 days

Fig. 18 2 days

Fig. 19 6 days

Fig. 20 10 days

Fig. 21 14 days

Fig. 22 18 days

Fig. 23 20 days

Fig. 24 22 days

Fig. 25 26 days

Fig. 26 30 days