
ATTI ACCADEMIA NAZIONALE DEI LINCEI
CLASSE SCIENZE FISICHE MATEMATICHE NATURALI
RENDICONTI

GIORGIO CARERI, ROBERTO FALCHETTI, LILIANA
TOMARCHIO, ANTONIO TONOLO

**Morphological observations on the preaggregating
slime mould amoebae**

*Atti della Accademia Nazionale dei Lincei. Classe di Scienze Fisiche,
Matematiche e Naturali. Rendiconti, Serie 8, Vol. 50 (1971), n.5, p. 577–579.*
Accademia Nazionale dei Lincei

[<http://www.bdim.eu/item?id=RLINA_1971_8_50_5_577_0>](http://www.bdim.eu/item?id=RLINA_1971_8_50_5_577_0)

L'utilizzo e la stampa di questo documento digitale è consentito liberamente per motivi di ricerca e studio. Non è consentito l'utilizzo dello stesso per motivi commerciali. Tutte le copie di questo documento devono riportare questo avvertimento.

*Articolo digitalizzato nel quadro del programma
bdim (Biblioteca Digitale Italiana di Matematica)
SIMAI & UMI*

<http://www.bdim.eu/>

SEZIONE II

(Fisica, chimica, geologia, paleontologia e mineralogia)

Biofisica. — *Morphological observations on the preaggregating slime mould amoebae.* Nota di GIORGIO CARERI, ROBERTO FALCHETTI, LILIANA TOMARCHIO e ANTONIO TONOLO, presentata (*) dal Corrisp. G. CARERI.

RIASSUNTO. — Viene mostrata la presenza di filamenti sottili nelle amebe di *Dictyostelium discoideum* in stato preaggregativo, filamenti che portano anche a contatti occasionali. Viene brevemente discussa la possibile funzione di questi filamenti.

In a recent paper Bonner, *et al.* [1] found evidence for stage specific responses of slime mould amoebae, namely that when amoebae decide to aggregate they abruptly change their system of chemiotactic response. The nature of the switch from one stage to another still remaining to be clarified, we believe worth reporting here a morfological observation on the amoebae which are at the border between these two stages. Essentially, we note the occurrence of quite a number of thin cilia around these pre-aggregating amoebae, and moreover we find evidence for some occasional contacts between them via cilia. One may wonder if these cilia can be involved in the switch mechanism between the two stages.

Our observations have been carried out by a Leitz phase contrast microscope with a strain of *Dictyostelium discoideum*. The amoebae were observed when deposited on a cover-slide under a standard liquid solution, following a technique already described by previous Authors [2], [3]. While the amoebae up to 6 hrs old showed the well known round shape, with occasional short pseudoplasmodia, the amoebae 6 to 12 hours old displayed a large number of cilia, or thin filaments (see fig. 1); these cilia then disappeared, until the 20 hours old amoebae finally aggregate. We believe worth mentioning the observation of casual contacts, between these 6 to 12 hours old amoebae, via their cilia (as shown in fig. 2). Essentially similar results have been found in other species of slime mould, as will reported in full in a later publication.

As far as we know the occurrence of these cilia has not been noticed before. The only observation of somewhat similar phenomenon, by Huffman and Olive [4], reveals the presence of bridges between vegetative amoebae, but involving 2 % of them only, and yielding to polinuclear cellular formation

(*) Nella seduta dell'8 maggio 1971.

of a permanent type. On the contrary, the occurrence of the cilia reported here involves all of the amoebae, and in a temporary period of their life only.

One may speculate about the use the amoebae can make of these cilia. One possibility is that by virtue of these cilia the amoebae can feel the presence of

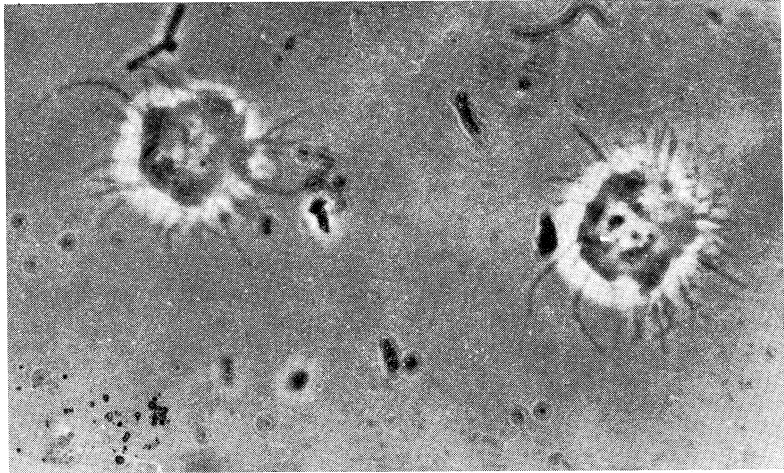


Fig. 1. - 6 hours old amoebae showing a large number of cilia. $\times 2000$.

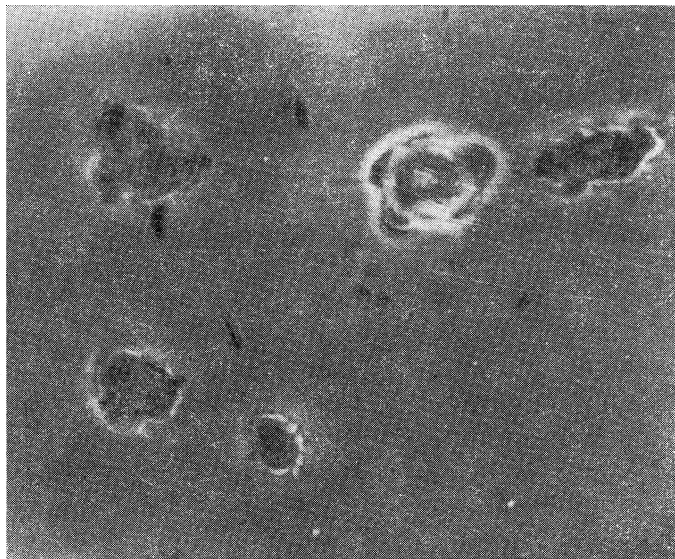


Fig. 2. - 16 hours old amoebae, joined by a thin filament. $\times 2000$.

each other on the same spot, and then decide to enter in the aggregative stage. This possibility is suggested by the fact that the critical lower density for aggregation [5] is around 15 amoebae/mm² only, a number that can be easily accounted for if the cilia play a role to establish a mutual contact.

According to this picture, the amoebae would first realize if they have reached the proper number density in order to enter in the aggregative stage, and the cilia would then provide the switch mechanism to proceed from one stage to the next one. To substantiate further this picture, one should prove that the formation of cilia occurs in amoebae which are still insensitive to acrasin, an experiment that has not been performed as yet.

BIBLIOGRAPHY

- [1] J. T. BONNER, E. M. HALL, W. SACHSENMAIR and B. K. WALKER, « J. of Bacteriology », 102, 682 (1970).
- [2] J. T. BONNER, « J. Exp. Zool. », 106, 1 (1947).
- [3] B. M. SCHAFFER, « Science », 123, 1172 (1956).
- [4] D. M. HUFFMAN and L. S. OLIVE, « Am. J. of Botany », 51, 456 (1964).
- [5] J. T. BONNER, *The cellular slime molds*, 2nd Edition, Princeton University Press (1967).