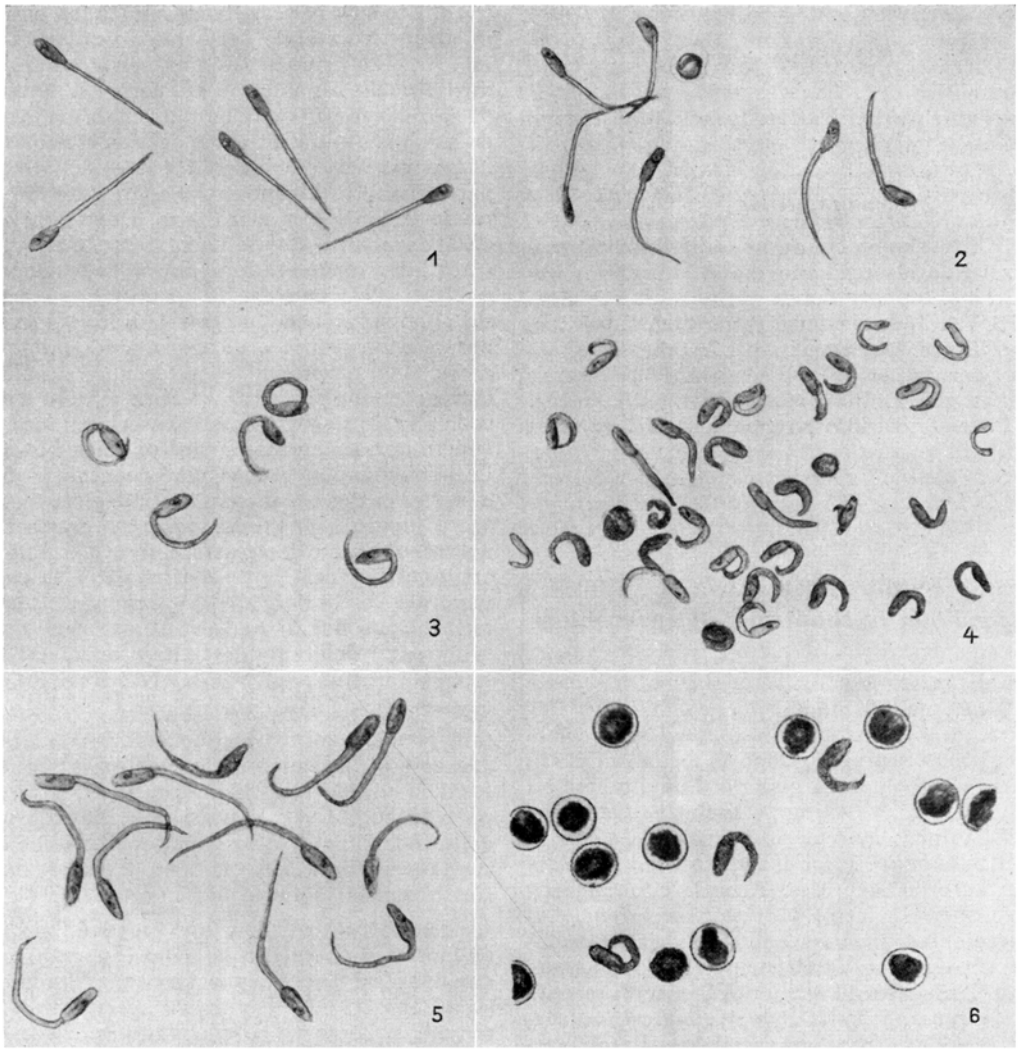

Fig. 1. Larve controllo sviluppate in atmosfera di aria. – Fig. 2. Larve sviluppate in un'atmosfera di 20 parti N_2 e 80 parti di aria. – Fig. 3. Larve sviluppate in un'atmosfera di 50 parti N_2 e 50 parti di aria. – Fig. 4. Larve sviluppate in un'atmosfera di 80 parti di N_2 e 20 parti di aria. – Fig. 5. Larve sviluppate in NaN_3 $M/1000$ e in atmosfera di aria. – Fig. 6. Larve sviluppate in NaN_3 $M/1000$ e in un'atmosfera di 20 parti N_2 e 80 parti di aria.

system of the tail. The results are explained on the grounds of the recent views acquired concerning the precocious segregation of the cytochromoxidase, tied to the mitochondria in the cells which are to form the muscle system.

"Fission zone" in *Spirostomum ambiguum*

Binary fission is a recognizable phenomenon in the life cycle of all protozoa, where the nucleus as well as the cytoplasm divide more or less simultaneously. Among the events that characterize fission in ciliates, three are important: mitosis of the micronucleus, amitosis of the macronucleus, and formation of fission line along which cytoplasmic cleavage takes place. There is a significant lack of literature regarding the specific conjunction of environmental, cytosomal, and nuclear conditions that bring about fission. WEISZ's[1] studies on *Stentor coeruleus* constitute the only work in which an attempt is made to relate these expressions. The stimulus that initiates fission is probably endogenous, but it seems certain that it is not experimentally controllable (WEISZ[2]). Experiments on dividing Stentors show that the removal of macronucleus does not affect fission.

As GRUBER[3] observed long ago, "we are dealing with a movement whose course no longer can be halted, even if the moving force is removed".

The most striking external indication of fission is the formation of a furrow which gradually deepens and divides the animal into two parts. The precise spot where the furrow is formed—the fission zone—seems to be determined long before its actual appearance or the appearance of any other external sign of fission (CALKINS[4],

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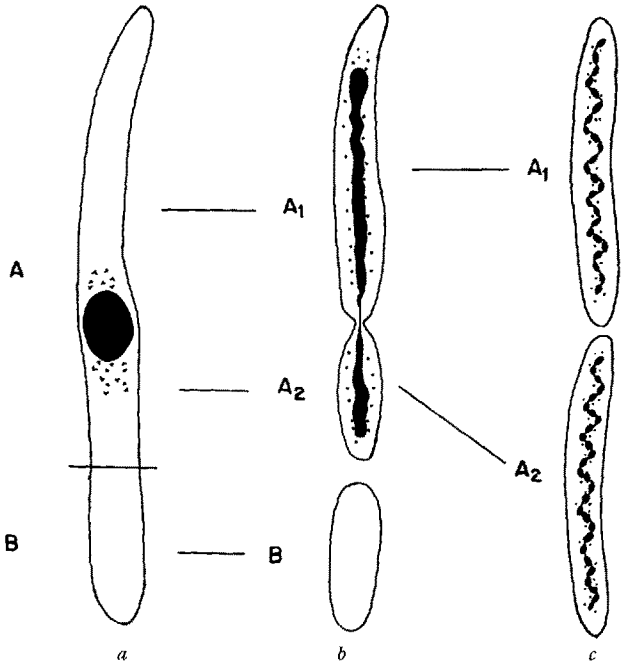
[2] P. B. WEISZ, J. exp. Zool. *131*, 137 (1956).
[3] A. GRUBER, Biol. Zbl. *5*, 137 (1885).
[4] G. N. CALKINS, J. exp. Zool. *10*, 95 (1911).

PEEBLES[5], BALAMUTH[6], WEISZ[7]). This would explain the fact, first mentioned by BALBIANI[8], that merotomy does not interrupt the physical cleavage process and may result in the production of unequal sized offspring. On the basis of extensive observations on *Paramecium caudatum*, CALKINS[4] postulated the occurrence of an irreversible division plane in the centre of the cell which was not regulated to suit any given exigency. PEEBLES[5] and CALKINS[4] emphasized that in all cases the outcome of merotomy depended on the physiological condition of the animal.



Division zone in *Spirostomum ambiguum*. *a* Animal in prefission stage with condensed macronucleus. A transverse cut has separated a posterior fragment (*B*) from anterior portion (*A*). *b* 3 h later; fragment *B* dies. Cleavage furrow has appeared in *A* and separated it into two unequal parts, A^1 and A^2. *c* 48 h later; A^1 and A^2 have grown into normal vegetative animals.

STEVENS[9] and WEISZ[1] in *Stentor*, and FAURÉ-FREMIET[10] in *Urostyla*, have shown that binary fission is a reversible process up to a certain stage. Merotomy during later stages showed that the cleavage plane had become irreversible.

Experiments on *Spirostomum ambiguum* provide a further insight into the phenomenon of determination of cleavage furrow in this species. Predivision *Spirostomum* specimens in the progress of binary fission were selected from stock cultures. Animals with condensed macronucleus were picked. The condensation of the macronucleus into a polymorphic body represents an early stage in division (BISHOP[11], PADMAVATHI[12], SESHACHAR and PADMAVATHI[13]). With steel needles, a fourth of the animal, at the posterior end, was cut off (Fig. *a*). This section (*B*) did not contain any macronucleus. The fragment was isolated, but failed to regenerate; it died 2 h later. In 3 h time, a cleavage furrow appeared in (*A*) and separated it into 2 highly unequal parts (A^1 and A^2), the anterior of which was about half the size of the original animal while the posterior was a much smaller body (Fig. *b*).

Both were kept in the nutrient medium and grew into normal animals at the end of 48 h (Fig. *c*). The same result was obtained when the anterior fourth (instead of the posterior) was removed.

The above experiment clearly indicates that (a) a fragment without the macronucleus cannot survive, and (b) the "fission zone" is determined by the time condensation of macronucleus occurs. Regeneration experiments on animals in the vegetative condition (unreported data) show that at this stage the "fission zone" is not yet established. The present study on *Spirostomum ambiguum* leads us to conclude that the "fission zone" is laid down during the process of condensation of the macronucleus and is not subject to change later. According to WEISZ[2], the division process in *Stenor* is found to pass through an early reversible and a later irreversible phase. The fission line itself may be the explicit result of the postulated physiological bisection of the individual. In *Spirostomum ambiguum*, this becomes irreversible after condensation of the macronucleus.

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Zusammenfassung

Regenerationsexperimente haben gezeigt, dass bei *Spirostomum ambiguum* die Lage der Einschnürungsstelle schon vor der Teilung festgelegt wird. Die Determination der Furche erfolgt zur Zeit der Kondensation des Makronukleus.

High Angle X-Ray Diffraction and Chemical Studies on the Nature of Fibrous Glia [1]

With a view to the limited amount of knowledge so far available on the nature of fibrous glia, we have performed biochemical and biophysical investigations on the so-called "corneal laminae" which may be found in the lining of the human cerebral ventricular cavities. These laminae are thick in cases of hydrocephalus and are composed of pure fibrous glia (BAIRATI, PANNESE[2]).

Chemical Investigations.– Total lipids have been determined by the method of FOLCH *et al.*[3]. The amino-acid composition of the proteins of fibrous glia has been

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[1] From the Institute of normal Anatomy, University of Milan, Italy (Director Prof. A. BAIRATI), and the Clinic for Occupational Diseases, University of Milan (Director Prof. E. C. VIGLIANI). The Siemens Kristalloflex III X-ray apparatus, which has been used in this research, is part of the equipment of the Industrial Hygiene Laboratory of the Montecatini Co., attached to the Clinic for Occupational Diseases.

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