

Schreckstoff und Schreckreaktion fehlen^{1,3,11,12,13}. Nun zeigte sich, dass diese Aussage, zumindest bezüglich der Schreckstoffzellen und Galaxoidei wahrscheinlich eingeschränkt werden muss.

Mit *Galaxias attenuatus* (Jenyns 1842) wurde ein Angehöriger der bisher nicht geprüften Galaxiidae (Galaxoidei, Salmoniformes) untersucht¹⁴. Die juvenilen Fische waren 35 mm lang und stammten aus dem Lago Nahuel Huapi, Provinz Rio Negro, Argentinien¹⁵. Sie waren in Formalin fixiert und in 70% Äthylalkohol aufbewahrt worden. Die Epidermis von 2 Exemplaren wurde histologisch untersucht. Die 6–10 μ dicken Paraffinschnitte wurden mit Hämalaun-Eosin gefärbt.

Die Epidermis dieser Fische ist 25 μ dick und enthält eine Lage «Kolbenzellen» mit 15–18 μ Durchmesser. Die Kolbenzellen reichen weder bis zur Basis noch bis zur Oberfläche der Epidermis. Ihr Zellkern liegt zentral und wird von einem hellen Hof umgeben. Daran schliesst sich der färbbare Hauptinhalt. Ein Vergleich dieser Kolbenzellen von *Galaxias* mit den Schreckstoffzellen von Gonorhynchiiformes³ und Cypriniformes^{1,3,8} ergibt keine Unterschiede. Die Kolbenzellen von *Galaxias* gleichen morphologisch völlig den Schreckstoffzellen der Gonorhynchiiformes und Cypriniformes. Ob sie ihrer Funktion nach Schreckstoffzellen sind, können nur Experimente über die Schreckreaktion entscheiden. Die Schwarmbildung bei juvenilen Galaxiidae spricht für eine Schreckreaktion. Das Vorkommen von Kolbenzellen bei *Galaxias*, die den Schreckstoffzellen der Gonorhynchiiformes und Ostario-

physi gleichen und vielleicht ebenfalls Schreckstoffzellen sind, passt zu der Auffassung⁸, dass die Gonorhynchiiformes und die Ostariophysi auf salmonoid-artige Ahnen zurückgehen.

Summary. The epidermis of *Galaxias attenuatus* (Galaxiidae, Salmoniformes) was found to contain club cells that are like the alarm substance cells of the Gonorhynchiiformes and Cypriniformes. Whether they are alarm substance cells, can be decided only by experiments on the fright reaction. The existence of club cells in the Galaxiidae confirms the opinion that both the Gonorhynchiiformes and the Ostariophysi derived from salmonoid-like fish.

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¹¹ W. PFEIFFER, Biol. Rev. 37, 495 (1962).

¹² W. PFEIFFER, Experientia 19, 113 (1963).

¹³ W. PFEIFFER, Naturwiss. 53, 565 (1966).

¹⁴ Für die Überlassung des wertvollen Materials danke ich der Zoologischen Sammlung des Bayerischen Staates; für die Bestimmung der Art gilt mein besonderer Dank Herrn Dr. F. TEROFAL, München.

¹⁵ Sie wurden im Dezember 1951 von Herrn A. THORHAUSER gesammelt.

Inhibition of Growth of the Seedlings of *Phaseolus radiatus* Linn. by N-Benzyl Orthofluorophenoxy Acetamide - A New Growth Retardant

Recently orthofluorophenoxy- α -methyl acetic acid has been reported to be a strong growth retardant for the growth of the seedlings of *Phaseolus radiatus* Linn.¹ Its inhibitory effect on some metabolites has also been studied^{2,3}. The growth-retarding activity of N-benzyl orthofluorophenoxy acetamide was found to be more potent than the chemical reported above. The chemical was found to be insoluble in water but soluble in alcohol. The solution of the chemical was prepared by dissolving 100 mg of it in 10 ml of absolute alcohol, and finally raising the volume to 1 l, with distilled water. From this 100 ppm stock solution, the solutions of lower concentrations were prepared.

The seeds of *P. radiatus* were soaked in solutions of different concentrations of the chemical, i.e. 5, 10, 25 and 50 ppm for 6 h. The control seeds were soaked in 1.0% ethanol for the same period. After soaking, the seeds were thoroughly washed with distilled water and were allowed to germinate in sterilized petri-dishes lined with moist filter papers at 30°C in an incubator.

The length of the radicle and hypocotyl was recorded after 18 h of soaking and thereafter at an interval of every 12 h. The mean length of the radicles and hypocotyls were recorded for 30 seeds grown in 3 petri-dishes each containing 10 seeds. The results have been presented in the Figures 1, 2 and 3. After 12 h of germination of the seeds 43% inhibition in growth was recorded in the seedlings treated with 5 ppm of the solution. At 10 ppm the inhibition in growth of the seedling was about 55%. The growth of the radicle was inhibited to a greater extent than the growth of hypocotyl. The radicle of the seedlings were completely killed at a concentration of 10 ppm and

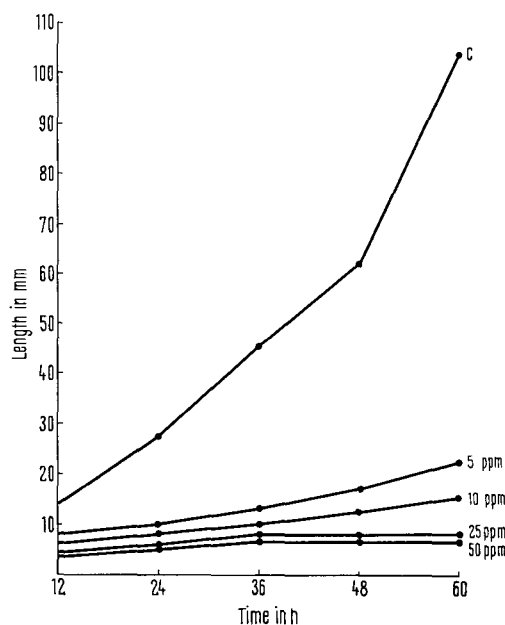


Fig. 1. Effect of N-benzyl orthofluorophenoxy acetamide on the growth of the seedlings.

¹ M. N. TEWARI, Curt. Sci. 37, 236 (1968).

² M. N. TEWARI, Ph. D. Thesis, Jodhpur University (1965).

³ M. N. TEWARI, Proc. Indian Sci. Congr. 3, 350 (1967).

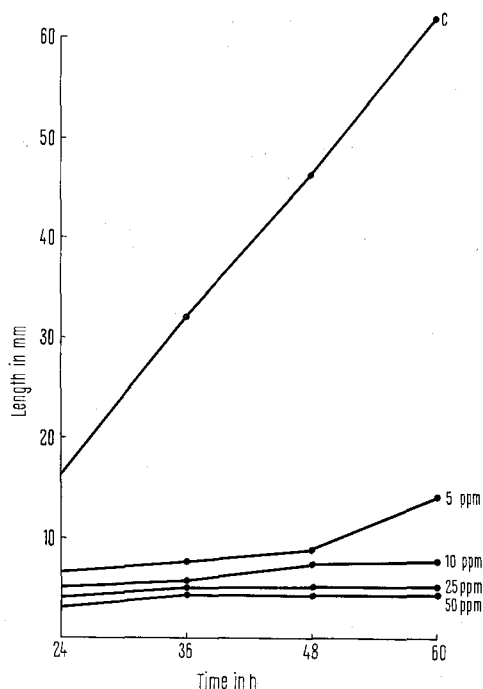


Fig. 2. Growth of the radicle as affected by different concentrations of the chemical.

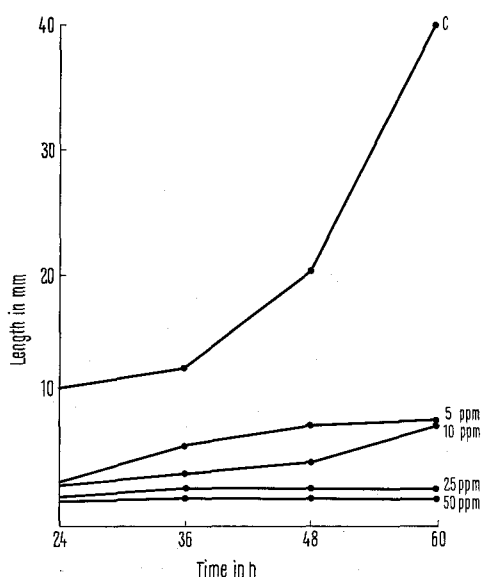


Fig. 3. Growth behaviour of the hypocotyl as affected by different concentrations of the chemical.

above. After 60 h of germination, the growth of the radicle was 4 times more in control seed than in the seeds treated with 5 ppm of the chemical. The growth of the hypocotyl was about 5 times more than the seedlings treated with 10 ppm of the chemical.

The radicles of the treated seedlings showed enormous swelling or 'radicle elephantiasis' (Figures 4 and 5), which resulted in their complete bursting at a concentration of 10 ppm and above. The cotyledons maintained a deeper green colour in the treated seedlings than in the control

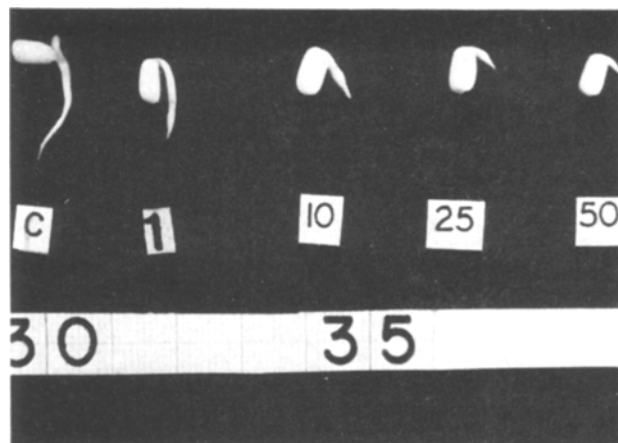


Fig. 4. The seedlings of *P. radiatus* after 24 h of germination. Concentration of the chemical in ppm used is given below the seedlings. C, control. At 10 ppm and above the 'radicle elephantiasis' has started.



Fig. 5. The growth of the seedlings of *P. radiatus* after 5 days of germination from left to right as in Figure 4. The radicals of the seedlings at a concentration of 10 ppm and above show distinct 'elephantiasis' and cracks.

ones. The chemical appears to inhibit growth not due to its toxic effects but probably due to its antiauxin properties. The swelling of the radicles is due to the prevention of elongation of its cells and not due to toxicosis⁴.

Zusammenfassung. Die Wirkung des N-benzyl-Derivates von Orthofluorophenoxyacetamid als Wachstumshemmer wird beschrieben.

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