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A New Articular Facet in the Upper Jaw of the Cyprinid Fish Genus *Pseudorasbora*

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In the teleosteans, the upper jaw articulates with the cranium in two regions: anteriorly, the palatine gains articulation with the lateral aspect of the preethmoid bone and there is also a ligamentary connection of the palatine in front of this; posteriorly, the hyomandibula articulates by a single or double head with the sphenotic-pterotic region. This is the methyostylic suspension.

While examining the skulls of fishes of the subfamily Gobioninae (Cyprinidae), I noticed in *Pseudorasbora parva* (Temminck and Schlegel) an interesting additional articulation of the upper jaw. Besides exhibiting the palatine (Fig. 1: ligament facet; preeth. fac.) and hyomandibular (hyomand.) articulations, the upper jaw of *Pseudorasbora* has also gained an articulation by its entopterygoid (entoptery). The latter has a prominent process (prevom. facet) mesially, slightly anterior to its joint with the palatine, by which it articulates with a well-developed facet on the prevomer. This articulation is just behind that of the palatine with the lateral face of the preethmoid.

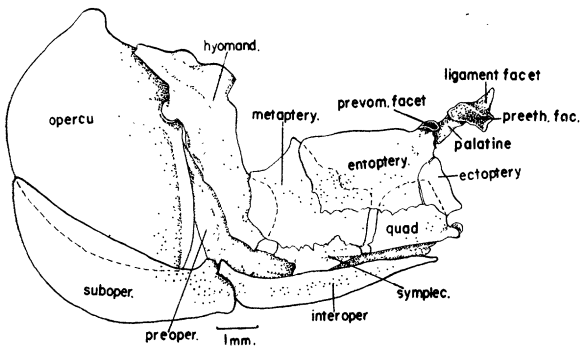

FIG. 1. Mesial aspect of the upper jaw of *Pseudorasbora parva*.

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The entopterygoid and palatine articulations are both anterior to the lateral ethmoid bone. Exactly how this additional strengthening is helpful to the animal is difficult to say. The fish lives in placid waters, and therefore the new joint may not be adaptational. Even the young of *Pseudorasbora* show the presence of a typical entopterygoid-prevomer joint.

As far as I am aware, the entopterygoid articulation of the upper jaw with the prevomer in the ethmoid region has so far not been recorded for any fish.

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Synergism and Antagonism of Auxin by Antibiotics[1]

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Various compounds have been found to increase the activity of auxins and others to inhibit or reverse their action (*1–3, 6, 8–10*). This report is concerned with similar effects produced by antibiotics. Three methods were used to test the effects of antibiotics on growth responses of plant materials to indoleacetic acid (IAA): (1) the *Avena* section test of Bonner (*7*), (2) development of cucumber seedlings in sterile agar, and (3) development of cucumber seedlings in moist chambers.

According to the first method, IAA increases elongation of sections of *Avena* coleoptiles floated in the test solution. When used alone, the antibiotics oxytetracycline (terramycin), chloramphenicol, and streptomycin, up to 25 ppm, had no significant effect on elongation, but when used together with IAA (1 ppm) there was greater elongation than from IAA alone. There were no consistent differences in the effects of concentrations of the antibiotics between 1 and 25 ppm. The response to streptomycin in repeated tests was more variable than that to the other two compounds. Citrinin, thiolutin, and clavacin, when used alone, inhibited elongation somewhat, but when used with IAA they reduced the growth-induc-

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TABLE 1

INFLUENCE OF IAA AND CITRININ ON DEVELOPMENT OF PRIMARY ROOTS OF CUCUMBER

Citrinin	Mean length of primary root, mm*	
	No IAA	0.5 ppm IAA
0	66.5	41.2
1.0	60.5	42.9
2.5	63.5	52.0†
5.0	65.5	51.1†
10.0	56.7	47.4
25.0	51.3	44.1

* 20 seeds in each series.
† Reversal significant at 0.05 level.

ing effects of the auxin. Gliotoxin and rimocidin had no appreciable effect either alone or with IAA.

In the second method, the seedcoats of cucumber seeds were removed and the seeds were surface sterilized and planted aseptically on the surface of tubes of agar gel containing $M/30$ phosphate buffer of pH 6.0. The agar remained otherwise untreated in some cases, whereas in others IAA or antibiotics or both were added. With IAA at 0.1 ppm or less there was no apparent effect on the seedlings, but at higher concentrations there was root inhibition that increased with increases in the amount of IAA. At concentrations of 5–50 ppm IAA there was inhibition of the hypocotyl as well. Both oxytetracycline and clavacin at concentrations of 5–25 ppm reduced growth of roots and hypocotyl. When either material was used with IAA (0.5 ppm) the toxic effect was greater than that of the material without IAA. Streptomycin had little effect on seedling development either alone or in combination with IAA. As in the *Avena* section test, the effect of citrinin was opposite that of oxytetracycline. When used alone, citrinin had no apparent effect at 10 ppm, but when used with IAA (0.5 ppm) it partly reversed the inhibitive effects of IAA; the primary root was longer and laterals developed, whereas they were absent in the substrate that contained IAA alone.

In the moist chamber tests, cucumber seeds were placed in Petri dishes lined with filter paper moistened with the test solution. From 1 to 25 ppm citrinin was used in the test solution, either alone or with 0.5 ppm IAA. Measurements of roots were made after incubation in the dark at 28° C for 75 hr. Development of the primary root was apparently inhibited by the higher concentrations of citrinin used alone, but the differences were not statistically significant (Table 1). When used together with IAA, citrinin apparently partly reversed the inhibitive effect of IAA on growth of the primary root at concentrations of 2.5–25 ppm, but the reversal was statistically significant only at 2.5 and 5 ppm. Citrinin also partly reversed the inhibitive effect of IAA on development of lateral roots.

There were differences in the response of the seedlings to different concentrations of citrinin in the tests carried out in agar and in the moist chambers. For example, at 0.5 ppm IAA, development of the primary root was almost completely inhibited in the agar substrate, whereas it was fairly good in the moist chambers. These differences are ascribed to differences in the degrees of contact of the roots with the substrate under the two conditions; there was less contact of the roots with the substrate in the moist chambers.

The results provide evidence that antibiotics affect auxin action in distinctly different ways. Two types of effects received particular consideration: (1) A synergistic effect was most evident by the *Avena* section test with oxytetracycline and chloramphenicol; the effect was less pronounced with streptomycin. A suggestion of an increase in the auxin effect was noted also with these antibiotics in the seedling test, where development was inhibited. (2) The second effect was reversal or inhibition of auxin action (antiauxin) by citrinin. This effect was most evident by the seedling test, but was also indicated by the *Avena* section test.

The effects of antibiotics on auxin action may become of practical importance if antibiotics are used to control plant diseases (*2*) or to increase the rate of plant growth (*3*).

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The Odors of Optical Isomers

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The reports that certain pairs of optical antipodes display different odors have been cited as arguments against the Beck-Miles (*1*) infrared theory of olfaction in its original form. We have reinvestigated one such pair of optical isomers and have failed to confirm the original results (*2*).

The examples investigated, the *d* and *l* dimethyl *trans* hexahydrophthalates, were chosen because they

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