



### FROG AND ASCIDIAN TADPOLES

are similar both on the surface and internally. But one becomes an active, bright-eyed, noisy vertebrate, while the other attaches itself barnacle-like to a rock, sheds its rudimentary spinal column, and vegetates for the rest of its days.

found encrusting rocks, stones, and weeds on the sea-bottom. Sometimes they are solitary, but many of them produce buds, like plants, and so form compound masses or sheets of individuals all connected and continuous with one another, like the buds on a creeping plant.

We will examine one of the simple forms—a tough mass like a leather bottle with two openings; water is continually passing in at the one and out at the other of these apertures. If we remove the leathery outer case, we find that there is a soft creature within which has the following parts: Leading from the mouth a great throat, followed by an intestine. The throat is perforated by innumerable slits, through which the water passes into a chamber—the cloaca: in passing, the water aerates the blood which circulates in the framework of the slits. The intestine takes a sharp bend, which causes it to open also into the cloaca. Between the orifice of the mouth and of the cloaca there is a nerve-ganglion.

My object in the next place is to show that the structure and life-history of these Ascidians may be best explained on the hypothesis that they are instances of degeneration; that they are the modified descendants of animals of higher, that is, more elaborate structure, and in fact are degenerate Vertebrata, standing in the same relation to fishes, frogs, and men, as do the barnacles to shrimps, crabs, and lobsters.

The young of some, but by no means of all these Ascidians, have a form totally different from that of their parents. The egg of *Phallusia* gives rise to a tadpole, a drawing of which placed side by side with the somewhat larger tadpole of the common frog is seen in the adjoining figure. The young Ascidian has the same general shape as the young frog, but not only this; the resemblance extends into details, the internal organs agreeing closely in two cases. Further

still, as shown by the beautiful researches of the Russian naturalist. Kowalewsky, the resemblance reaches absolute identity when we examine the way in which the various organs arise from the primitive egg-cell. Tail, body, spiracle, eye, and mouth agree in the two tadpoles, the only important difference being in the position of the two mouths and in the fact that the Ascidian has one eye while the frog has two.

Now let us look at the internal organs. There are four structures, which are all four possessed at some time of their lives by all those animals which we call the Vertebrata, the great branch of the pedigree to which fishes, reptiles, birds, beasts, and men belong. And the combination of these marks or structural peculiarities is an overwhelming piece of evidence in favour of the supposition that the creatures which possess this combination are derived from one common ancestor. . . . These four great

structural features are—first, the primitive backbone or notochord; second, the throat perforated by gill-slits; third, the tubular nerve-centre or spinal cord and brain placed along the back; and, lastly, and perhaps most distinctive and clinching as an evidence of affinity, the myelonic or cerebral eye.

Now let us convince ourselves that these four features exist not only in the frog's tadpole, as they do in all fishes, reptiles, birds, and beasts, but that they also exist in the Ascidian tadpole, and, it may be added coexist in no other animals at all.

The corresponding parts are named in the figures in such a way as to render their agreement tolerably clear. . .

It is clear then that the Ascidians must be admitted to be Vertebrates, and must be classified in that great sub-kingdom or branch of the animal pedigree. The Ascidian tadpole is very unlike its parent the Ascidian, and has to go through a process of *degeneration* in order to arrive at the adult structure. . . It will be observed, that in somewhat the same manner as the young barnacle, the young Ascidian fixes itself to a stone by its head; then the tail with its notochord and nerve-chord atrophies. The body grows and gradually changes its shape, whilst the cloacal chamber forms. The brain remains quite small and undeveloped, and the remarkable myelonic eye (the eye in the brain) disappears. The number of gill-slits increases as the animal grows in size and its outer skin becomes tough and leather-like.

*Science News Letter, June 3, 1933*

#### AGRICULTURE

## U. S. Wheat Crop To Be Shortest in Generation

**W**INTER WHEAT in the United States promises the shortest crop since 1904, the May issue of *Wheat Studies* of the Food Research Institute estimates. The official forecast as of May 1 indicated a crop of only 337 million bushels, 125 million below the standing estimate of last year's crop. Acreage abandonment was unprecedentedly high, over 32 per cent., leaving the smallest area for harvest since 1912.

Reports of farmers' intention to plant spring wheat indicated that the acreage sown this spring in North America may be four or five per cent. smaller than the area planted in 1932. Since the pub-

lication of the Institute's report, unfavorable weather has held back spring wheat planting, along with practically all other crops, so that some shortage in spring wheat may be expected also, though whether it will be as great as that in winter wheat cannot be predicted at present.

One major wheat harvest of the world, that in India, has already been reaped, the report states. It is officially estimated at 340 million bushels, a trifle larger than the 1932 crop. It is not expected that the Indian crop will have much influence on world wheat prices during the May-July period. (*Turn Page*)

European wheat-importing countries are still striving for as much self-sufficiency as possible in wheat. They are expected to harvest as large an area as last year's, if not a little larger, but the crop is expected to be smaller by 100 to 150 million bushels. This will be at least partly balanced, however, by a larger crop anticipated from the great wheat-exporting regions on the Danube.

In Russia the area sown to winter wheat was more than four million acres smaller this year than last, and spring wheat plantings will probably be no larger. But even if the crop increases, as is fairly likely, much of the early surplus normally exported will have to relieve the domestic food shortage.

*Science News Letter, June 3, 1933*

## BOTANY

## Ever Eat Gum-Jum? Try It In Soup

CHINESE cookery is credited with using weird things, like birds' nests, sharks' fins and exceedingly ancient eggs; but the Chinese are also capable of dishes incorporating real poetry. Dr. A. B. Stout of the New York Botanical Garden describes in an official publication of that institution the use in China of dried flowers of the day-lily, cut up in soup, which he says gives the dish a distinctive and agreeable flavor.

The Chinese names for this commodity are gum-jum, which means golden needles, and gum-tsoy, meaning golden vegetable. New York's Chinatown imports quantities of these dried lilies, as much as two tons having come into the port in one year.

*Science News Letter, June 3, 1933*

## INDIVIDUAL DIFFERENCES IN MENTAL GROWTH

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by

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Friday, June 9, at 1:45 p. m. Eastern Standard Time over stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

## ORDNANCE

# Squeezed Bullets Fired at Mile a Second From New Gun

**B**ULLETS speeding at a mile a second, able at moderate ranges to drive through the tough steel armor plates of tanks, can be fired from a new type of rifle invented by H. Gerlich, an American-born German citizen now resident in England. Because of their potentialities as anti-tank and anti-aircraft weapons, the Gerlich rifle and ammunition are under investigation by the small-arms technicians of the U. S. Army, as well as by several foreign powers.

The Gerlich bullet is something of a paradox. It is of .35 caliber when it goes into the breech of the rifle, and when it comes out of the muzzle it is of only .25 caliber. That means that its diameter has been squeezed down a tenth of an inch as it has travelled through the bore.

This is done by having the bore tapered through a part of its length. The first section forward of the ammunition chamber is cylindrical and of .35 caliber. Then comes a section in which the bore tapers from .35 down to .25 caliber. Finally there is a third section, ending at the muzzle, that is cylindrical and of .25 caliber.

This arrangement enables the bullet to start with a wide area to take the push of the powder gases, and to leave the rifle with a small area, suffering less loss of velocity from air resistance.

To obtain a "compressible" bullet that can be fired from a barrel of this type, Mr. Gerlich fashioned his projectile of .25 caliber, with two flaring bands or flanges of .35 caliber. These fit into the .35-caliber section of the bore, and as the bullet travels down the tapering section they are folded down, fitting into channeled spaces cut into the body of the bullet behind them. The bullet thus leaves the rifle as a smooth cylinder coming to a sharp point at one end, not essentially different from the conventional rifle bullets in common use.

The terrific velocity of 5,000 feet a second, nearly double that of standard army rifles, gives the new weapon several advantages. It naturally flattens the line of flight or trajectory considerably, so that the soldier using it need not trouble himself so much about having the right elevation. It shortens the time

of flight from rifle to target, a highly important matter for anti-aircraft machine gunners. Finally, it enables the small-caliber bullet to drive straight through tank armor, even without the advantage of special armor-piercing devices; for at such velocities even soft projectiles have no time to "upset" on striking a hard target—they act like the straws that get driven through boards in a tornado.

All these advantages must of course be purchased at a price. The rifle barrel, with its somewhat complicated bore, is more difficult to make, and more expensive. The ammunition is considerably costlier also, and its greater bulk in transportation is something of a military disadvantage. The recoil is heavier. Whether the rifle will wear out faster under firing conditions is not yet determined.

Nevertheless, if military authorities see sufficient tactical advantages in the new weapon, its final adoption may be expected.

*Science News Letter, June 3, 1933*

## ENDOCRINOLOGY

## Gland Secretion Rescues Children From Dwarfism

**S**SIX CHILDREN and one young man of 18 years, doomed to be dwarfs, were rescued from this fate by treatment with a growth-stimulating hormone from the pituitary gland. Results of the successful treatment are reported by Drs. William Engelbach, R. L. Schaefer and W. L. Brosius of Detroit in *Endocrinology*. Only one other human subject is reported to have received this treatment, a patient of Dr. Engelbach who showed a favorable response.

The young people of the present report ranged in age from 7 to 18 years. They were from about two inches to more than a foot shorter than the shortest height normal for children of their ages. One seven-year-old girl was only one inch taller than her three-year-old sister.

Examinations showed that the growth deficiency was due to deficient functioning of the pituitary gland. Some of