COMMENTS by Readers

large end segments of the chromosomes This means that somatic cells undergo of Ascaris are discarded in the somatic only a small number of divisions, after cell lineage while the chromosomes re- which further growth is intracellular main intact in the germ track, the growth leading to a small number of giant phenomenon, chromatin diminution, has cells in most organs. Only the sex cells attracted the attention of cytologists. retain the ability for almost unlimited Chromatin diminution has since been division. This means, we think, that the found to occur in other nematodes and in heterochromatin is needed for continuous Diptera (Cecidomyids, Sciara), the mitotic cell division. A detailed discussion cytological details being different from including also the situation in Diptera, case to case. Among the numerous ex- and the relation of the cytological facts to planations proposed (most recent one by the genetics of heterochromatin, will be von Ubisch), that most in line with presented later with the detailed facts. modern conceptions is that the diminished (RICHARD B. GOLDSCHMIDT and TEH chromosome parts must be "inert so far PING LIN, Department of Zoology, Unias the soma is concerned" (White). versity of California, Berkeley.)

A re-examination of the cytological facts, using the Feulgen technique, proves beyond doubt that the discarded chromosome ends consist of heterochromatin. The decisive fact is that this substance is condensed during synapsis into a large, deeply staining chromocenter which fills ence, June 7, 1946, p. 686) that the activa considerable part of the nucleus and ity of hyaluronidase in vivo, as measured to which the chromatin strands are attached. In pachytene this chromocenter into the skin of rabbits or human subis broken up and again distributed as jects, is inhibited by salicylate. However, four heteropycnotic ends of the tetrads. when the activity of the enzyme was Boveri's old figures show, though it could not be interpreted correctly at that time, viscosity of its substrate, hyaluronic acid, that there is also heteropycnosis of the no inhibition was observed when salichromosome ends in telophase of the cylate was added to the system. This is first division of the egg. The Feulgen in accord with the observation of Pike technique confirms this in a most convincing manner. Later, at the time of diminution, the Feulgen stain reveals in action of the salicylate might be due to a Miranda-Ribeiro (Arch. Mus. Nac. Rio early metaphase that almost all Feulgen metabolite formed by the organism. positive material is accumulated in the somatic the heterochromatic nature of the dimi- zoquinone, which was synthetized by nution chromatin.

ton). Nematodes are cell-constant an- Physiological Chemistry, University of imals, as shown a long time ago by Montreal.)

Ever since Boveri discovered that the Goldschmidt, Jägerskjöld, and Martini.

at at

It was demonstrated by Guerra (Sciby the area of spreading when injected measured in vitro by the decrease of the (Science, April 11, p. 391).

It was therefore concluded that the

Gentisic acid (2.5-dihydroxybenzoic chromosome ends to be discarded, while acid), which has been demonstrated by No doubt this species may produce as the middle parts of the collective chro- Kapp and Coburn to be a metabolite of many as 35,000 upon occasion. So far as mosomes which break up into the small salicylic acid (J. biol. Chem., 1942, I am aware no amphibian anywhere in chromosomes stain rather 145, 549), shows no inhibition. How- the world is known to lay more than this slightly. Thus, there can be no doubt of ever, the corresponding carboxy-p-ben- number at one time. us, shows strong inhibitory properties at in proportion to body size, members of This fact allows us to advance an a concentration of 2.5×10^{-3} M. A de- the genus Bufo are clearly more produchypothesis on the meaning of diminution tailed report of this work will be pubtive of eggs than any other anurans. which is in accord with some modern lished elsewhere. (JULIUS LOWENTHAL (HOBART M. SMITH, A. & M. College of views on heterochromatin (e.g. Darling- and ARTHUR GAGNON, Department of Texas, College Station, Texas.)

That anurans may lay as few as one egg per season is well known (Noble Biol. Amphib., 1931, 70; Sminthillus of Cuba). but the maximum number has been diversely stated.

The maximum produced by North American anurans is recorded by Dickerson (Frog Book, 1908, 3) as 12,000 (Bufo americanus), and by Wright and Wright (Handb. Frogs Toads, 1942, 8) as 20,000 (Rana catesbiana). These numbers are exceeded, however, in at least three North American species of toads: one Bufo a. americanus is known to have laid 20,309 eggs, and one B. w. woodhousii 25,644 (Smith Amer. mid. Nat., 1934, 15, 438, 452); and, as pointed out by Gadow (Amphibia Reptiles, 1923, 54), even these figures are exceeded by B. americanus terrestris, a specimen of which is recorded (Morgan. Amer. Nat., 1891, 25, 753) to have laid as many as 28,000.

The bullfrog itself is recorded by Cramer (Bull. Fla. St. Dept. Agric., 1936, No. 56, 37) as laying at least 21,840 eggs (this number of tadpoles was hatched from one spawn). In Viosca's Principles of bullfrog culture (New Orleans: Southern Biological Supply Co., 1934) the eggs are said to number as many as 25,000, a figure also given in the Fish and Wildlife Service's pamphlet on "Frog culture and the frog industry" (Fishery Leaflet No. 102. 1944. 3).

It is not unreasonable to suppose that very large specimens of at least one of these species may lay as many as 30,000, which may be accepted as the maximum for anurans of North America (except possibly B. horribilis).

Even this number is known to be exceeded elsewhere by B. marinus (tropical America; a close relative of B. horribilis), which, according to Alipio de de Janeiro, 1926, 27, 134), produces approximately 32,000 at each spawning.

It is also of interest to point out that,

