COMMENTS
by Readers

Ever since Boveri discovered that the large end segments of the chromosomes of *Ascaris* are discarded in the somatic cell lineage while the chromosomes remain intact in the germ track, the phenomenon, chromatin diminution, has attracted the attention of cytologists. Chromatin diminution has since been found to occur in other nematodes and in Diptera (Cecidomyids, Sciara), the cytological details being different from case to case. Among the numerous explanations proposed (most recent one by von Ubisch), that most in line with modern conceptions is that the diminished chromosome parts must be "inert so far as the soma is concerned" (White).

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 a considerable part of the nucleus and to which the chromatin strands are attached. In pachytene this chromocenter is broken up and again distributed as four heteropycnotic ends of the tetrads. Boveri's old figures show, though it could not be interpreted correctly at that time, that there is also heteropycnosis of the chromosome ends in telophase of the first division of the egg. The Feulgen technique confirms this in a most convincing manner. Later, at the time of diminution, the Feulgen stain reveals in early metaphase that almost all Feulgen positive material is accumulated in the chromosome ends to be discarded, while the middle parts of the collective chromosomes which break up into the small somatic chromosomes stain rather slightly. Thus, there can be no doubt of the heterochromatic nature of the diminution chromatin.

This fact allows us to advance an hypothesis on the meaning of diminution which is in accord with some modern views on heterochromatin (e.g. Darlington). Nematodes are cell-constant animals, as shown a long time ago by Goldschmidt, Jägerskjöld, and Martini. This means that somatic cells undergo only a small number of divisions, after which further growth is intracellular growth leading to a small number of giant cells in most organs. Only the sex cells retain the ability for almost unlimited division. This means, we think, that the heterochromatin is needed for continuous mitotic cell division. A detailed discussion including also the situation in Diptera, and the relation of the cytological facts to the genetics of heterochromatin, will be presented later with the detailed facts. (RICHARD B. GOLDSCHMIDT and TEH PING LIN, *Department of Zoology, University of California, Berkeley.*)

It was demonstrated by Guerra (*Science*, June 7, 1946, p. 686) that the activity of hyaluronidase *in vivo*, as measured by the area of spreading when injected into the skin of rabbits or human subjects, is inhibited by salicylate. However, when the activity of the enzyme was measured *in vitro* by the decrease of the viscosity of its substrate, hyaluronic acid, no inhibition was observed when salicylate was added to the system. This is in accord with the observation of Pike (*Science*, April 11, p. 391).

It was therefore concluded that the action of the salicylate might be due to a metabolite formed by the organism.

Gentisic acid (2.5-dihydroxybenzoic acid), which has been demonstrated by Kapp and Coburn to be a metabolite of salicylic acid (*J. biol. Chem.*, 1942, **145**, 549), shows no inhibition. However, the corresponding carboxy-p-benzoquinone, which was synthetized by us, shows strong inhibitory properties at a concentration of 2.5×10^{-3} M. A detailed report of this work will be published elsewhere. (JULIUS LOWENTHAL and ARTHUR GAGNON, *Department of Physiological Chemistry, University of Montreal.*)

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 Miranda-Ribeiro (*Arch. Mus. Nac. Rio de Janeiro*, 1926, **27**, 134), produces approximately 32,000 at each spawning. No doubt this species may produce as many as 35,000 upon occasion. So far as I am aware no amphibian anywhere in the world is known to lay more than this number at one time.

It is also of interest to point out that, in proportion to body size, members of the genus *Bufo* are clearly more productive of eggs than any other anurans. (HOBART M. SMITH, *A. & M. College of Texas, College Station, Texas.*)