

A study of the response of the spontaneous minute waves to changes in environment has shown that they are insensitive to relatively wide fluctuations of temperature.

The appearance of these waves to the eye is much like that of fibrillation in skeletal muscles; but the length of survival and the insensitivity to temperature fluctuations distinguish them from that phenomenon. It may be, however, that the phenomenon is essentially the same in both cases, but that its different characteristics in skeletal and cardiac muscle reflect rather intrinsic differences in these two types of striated muscle. It may be noted that Langley<sup>2</sup> found in cats that fibrillation may last half an hour after the death of the animal and thought this to be remarkably long.

Langley also noted that fibrillation in skeletal muscle is very sensitive to fluctuations of the normal temperature, cessation of fibrillatory activity being very quickly brought about by a fall from body to room temperature. Furthermore, if the spontaneous minute waves are due to fibrillation of the cardiac musculature, it is difficult to conceive how it is that they can be seen in the slowly beating heart, in which no apparent sign of fibrillation can be detected. On the other hand, like fibrillation, the spontaneous minute waves have been found to be sensitive to quinidine and procaine, both of which cause arrest of their activity. Urethane<sup>3</sup> was not found to prolong or increase their activity when drying of the surface film was prevented throughout the period of observation.

The following observations indicate that the spontaneous minute waves are present throughout the myocardium. When the heart is cut into small fragments, they continue their activity uninterruptedly. They are present in both ventricles and atria, and they can be observed on the walls of the chambers of the heart as well as on the outer surface. They are coarser and much more vigorous on the inner surfaces.

It is hoped to publish fuller details of this work elsewhere.

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<sup>1</sup> Prinzmetal, M., Corday, E., Brill, I. C., Oblath, R. W., and Kruger, H. E., "The Auricular Arrhythmias" (C. C. Thomas, Springfield, Ill.; Blackwell, Oxford, 1953).

<sup>2</sup> Langley, J. N., *J. Physiol.*, 51, 377 (1917).

<sup>3</sup> Hellmann, K., *J. Physiol.*, 110, 41P (1953).

### Phenolic Substances of Pear-Apple Hybrids

THE leaf of the apple contains as its principal phenolic the glucoside phloridzin. This is present in all *Malus* species examined, together with smaller amounts of the corresponding aglycone phloretin, a quercetin glycoside<sup>1</sup>, and traces only of chlorogenic acid and epicatechin. Pear leaf, in contrast, contains three phenolics in quantity: chlorogenic and isochlorogenic acids<sup>2</sup> and the glucoside arbutin, with small amounts of catechin, epicatechin, flavonol glycosides and hydroquinone, the aglycone of arbutin.

The glucosides phloridzin and arbutin appear to be quite specific in their distribution; in the course of a wide survey of leaves of apple and pear species

and varieties by paper chromatography, phloridzin has been found in all apples, but never in pears; conversely, arbutin has been found in all pears but not in apples.

The production of true sexual hybrids between the pear and apple<sup>3</sup> raised the question of the possible dominance of part or all of one phenolic pattern in the hybrid leaf. Through the kindness of the Director of the John Innes Horticultural Institution, it has been possible to examine leaves from a number of different pear-apple hybrids. Because of the limited amount of material available, 70 per cent alcoholic extracts of two-leaf samples were examined by paper chromatography in three different solvent systems; this enabled all the major and some, though not all, of the minor phenolics to be identified.

In all samples, the results indicated addition of the individual phenolic patterns in the hybrids; the leaves contained phloridzin, arbutin, chlorogenic and isochlorogenic acids in quantity, with lesser amounts of phloretin, epicatechin and flavonol glycosides. The amounts of each phenolic present varied somewhat among the different hybrids, but in no case were any of the typical phenolics completely absent. In the two triploid hybrids (diploid pear × tetraploid apple), the pear phenolics were relatively weaker than in those hybrids in which both parents were diploid or tetraploid.

This apparently simple addition of the parental phenolic patterns in the hybrids contrasts with the dominant-recessive relationships found with the anthocyanin colouring matters of flowers in intra-specific crosses.

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<sup>1</sup> Bradfield, A. E., and Flood, A. E., Rep. E. Malling Res. Sta. for 1949, 103 (1950). Williams, A. H., "Science and Fruit", 210 (University of Bristol, 1953).

<sup>2</sup> Bradfield, A. E., Flood, A. E., Hulme, A. C., and Williams, A. H., *Nature*, 170, 168 (1952).

<sup>3</sup> Crane, M. B., and Marks, E., *Nature*, 170, 1017 (1952).

### Growth of *Chondromyces crocatus* in Pure Culture

THE genus *Chondromyces* was named and illustrated, but not described, by Berkeley and Curtis in 1857 in Berkeley's<sup>1</sup> "Introduction to Cryptogamic Botany". It was apparently next seen by Thaxter<sup>2</sup>, who reported that he grew it in pure culture. In 1913, this species was stated by Pinoy<sup>3</sup> to grow only in the presence of *Micrococcus*. Beebe<sup>4</sup> reported the presence of *C. crocatus*; but attempts to purify the organism failed completely though it grew readily with various bacteria in mixed culture. Kuhlwein<sup>5</sup> stated that *C. crocatus* could not be grown in pure culture and that it was a symbiotic form. Oetker<sup>6</sup>, recently, has shown that several species in the genera *Myxococcus* and *Podangium* can grow upon yeast and algae.

*C. crocatus*, which may represent the highest morphological and nutritional specialization in the entire order Myxobacteriales, has recently been isolated from soil in our laboratory. The soil sample, obtained in Iowa, consisted of surface debris and soil taken from a permanent bed of rhubarb which, for a number of years, had been heavily fertilized