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Action of drugs upon the central nervous system of insects.

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Peculiarities revealed by study of the action of neurophil drugs in lepidopterous larvæ[1,2] led to an extension of the observations to include an imaginal insect. Effects following injection of solutions of drugs into the thorax of grasshoppers were compared with those attending the direct application of these substances to the thoracic ganglia (exposed by removal of the ventral thoracic sclerites). In all essentials, the two methods gave comparable results.

As in caterpillars, strychnine produces momentary general excitation, but only when present in very high concentration; it fails to induce "reversal of inhibition." In the grasshopper, however, such "reversal" appears after administration of nicotine or of camphor. The legs are thrown outward and upward if (under nicotine) the abdomen or a femur be touched, and (under camphor) when the mouth-parts are stimulated tactically. The grasshopper normally clasps a stimulating object if, as in these tests, the animal be held by a clip fastened upon the wing-covers. Nicotine, and pilocarpine, stimulate especially movements of the two posterior pairs of legs, while under camphor all three pairs and the mouthparts undergo spasmodic movements.

Grasshoppers, caterpillars, and crayfish[3] agree in presenting definite evidence of neuronic excitation by these substances: strychnine, pilocarpine, picrotoxin, nicotine, veratrine, atropine, caffeine, camphor, phenol. To this general correspondence there may be added certain aspects of detailed agreement. These arthropods differ pronouncedly from the earthworm in the fact that, with the latter,[4] nicotine, caffeine and phenol fail to pro-

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1 Crozier, W. J., PROC. SOC. EXP. BIOL. AND MED., 1922, xix, 326.

2 Crozier, W. J., *Biol. Bull.*, 1922, xliii, 239.

3 Moore, A. R., PROC. SOC. EXP. BIOL. AND MED., 1922, xix, 335.

4 Moore, A. R., *Jour. Gen. Physiol.*, 1921, iv, 29.

duce central nervous stimulation. There is reasonable ground, therefore, for the opinion that the central nervous systems of arthropods possess certain common features, revealed through the actions of neurophie drugs; and that these features distinguish the arthropod central nervous system from that of an oligochaete.

82 (2042)

Tallowiness in butterfat.

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Butterfat exposed to light and air rapidly takes on an odor and off flavor which has been termed "tallowy." Among the early workers who attributed the tallowness in fats to the direct action of oxygen are Winckel,[1] Scala,[2] Ryan and Marshall,[3] Vintilesco and Popesco,[4] and others. Winckel attributes such a state to the action of oxygen upon oleic acid, but he was not able to show the reactions in butter and cocoanut oil that he showed in other fats. Vintilesco and Popesco were apparently the first to postulate the direct union of oxygen with the unsaturated linkages of fats to form peroxides which readily release their oxygen in the presence of peroxidases, giving reactions with guaiacol.

Smith[5] favors the view that rancidity is induced by enzymes, while Hunziker and Hosman[6] attribute tallowness in butter to oxidation with subsequent splitting and the formation of fatty acids and glycollic acid. Palmer and Combs,[7] more recently, favor the view that tallowness in butter is dependent

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1 Winckel, M., *Apothekers Ztg.*, 1905, lxix, 690.

2 Scala, A., *Staz. spermi. agric. Ital.*, 1897, xxx, 613.

3 Ryan, L. A., and Marshall, J., *Am. Jour. of Pharm.*, 1907, lxxix, 308.

4 Ventilesco, J., and Popesco, A., *J. de Pharm. et d. Chimie*, 1915, xii, 318.