unknown in ants; intercastes are in nature rare, but easily produced experimentally, and are then intermediate in size as well as structure. If these facts are to be incorporated, the following hypothesis appears necessary: the duration of competence is brief and its onset dependent mainly on temperature; inductor concentration is proportional to size and has two significant thresholds, the lower initiating the development of queenness, and the higher completing it. To avoid natural intercastes and yet allow for their artificial production it is necessary to suppose that an extra impetus to growth is given to queen determined larvae and withheld or actually withdrawn from those which fail to secure induction. Intercastes would thus result from the metamorphosis of larvae with a concentration of inductor lying between the two thresholds.

Caste on this hypothesis would be determined as a result of a race between two processes, and it is encouraging to find, therefore, that in the related *Myrmica scabrinodis* temperature interferes differentially, for significantly more queens are produced in cultures at 18°C than at 25°C (in this respect these ants show a further resemblance to aphids). Failure of induction prevents additional increase in size and further differentiation. The worker is thus a form arrested before full potentiality is realised. Although it has no wing buds, it is not because they degenerate for they are extruded during metamorphosis, but are so small in their undeveloped state that they become merged with cuticular wrinkles by the time the adult form is reached (but are quite perceptible in the pupa). Degeneration does occur however in the ovariole rudiments.

So far, only the potentialities of hibernated larvae have been considered—and this accounts for half their full growth. The pre-dormancy factors relevant to caste, are not yet fully understood, but it seems that both dormancy and a period of "vernalisation" at low temperature are necessary for larvae to produce queens. Hibernation may thus be suitably construed as a period of quiescence in which the growth potentiality needed on regaining warmth, is built up. The size of larvae at dormancy is a function of nutrition in the preceding instars—not of egg-size, for this shows negligible variation. The fact that queens are only produced from hibernated larvae in *Myrmica* is part of a socio-ecological adaption which ensures that in the existing temperature-ontogeny relationship, sexuals are ripe for mating at the most suitable time of year. Queens are produced by large colonies in warm situations with abundant food supply, and in which the input of female brood is small in comparison with the vast labour force available to tend it.

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Zoological Department, Glasgow University, December 6, 1950.

Zusammenfassung

Bei Ameisen (*Genus Myrmica*) ist Kastenbestimmung rein trophisch. Königindetermination hängt davon ab, daß die weiblichen Larven vor einer bestimmten Zeit eine gewisse Größe erreichen und einen zusätzlichen Wachstumsanstoß zur Folge haben. Dieser Mechanismus erinnert an die für die Aphiden beschriebenen Vorgänge.

Biosynthesis of Cholesterol from Isobutyrate[1]

The utilization of the branched chain of isobutyric acid by the intact rat has been described in a previous paper[1]. At that time, the radioactivity incorporated into the various liver fractions was reported. It has now been demonstrated that an appreciable amount of radioactivity is incorporated into the carcass cholesterol and carcass fatty acid. In feeding experiments with deuterium-labeled isobutyrate, Rittenberg and Schoenheimer[2] and Bloch[3] reported that little or no deuterium was incorporated into cholesterol.

The method of injection and other experimental details have already been described[1]. After sacrifice of the rat, the carcass was homogenized and dried by lyophilization. The dried carcass was extracted with ether-alcohol 1:3 for 100 hours and the fatty acid and nonsaponifiable fractions were separated in the usual manner.

In the first case a total of 19·6 μc of isobutyrate were injected. Cholesterol, m.p. 147–148°, was isolated through the digitonide. The infra red spectrum of the extracted cholesterol was identical with that of an authentic sample[4]. In chromatography on "Quilon" treated paper[5], the cholesterol showed an R_f of 0·55 when methanol was the developing solvent. A radioautograph[6] showed that no other radioactive material was present.

The specific activity of the cholesterol was found to be 1500 disintegrations/min/mg C[7]. The specific activity of the carcass fatty acids was 1000 dis/min/mg C.

In two similar experiments in which 19·6 μc and 40·5 μc of isobutyrate were injected, cholesterol was isolated as the digitonide and assayed for radioactivity in this form. The specific activities, calculated for cholesterol, were 800 dis/min/mg C and 1800 dis/min/mg C respectively.

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David Kritchevsky and Irving Gray[8]

Radiation Laboratory, University of California, Berkeley, February 9, 1951.

Zusammenfassung

Es wird der Beweis erbracht, daß die Methyl-Gruppen der Isobuttersäure in das Cholesterin der Ratte einverleibt werden.

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[8] Major, Medical Service Corps, U. S. Army. Present address: Brooke Army Medical Center, Fort Sam Houston, Texas.

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Zur Bausteinanalyse des Clupeins

In ihren letzten Mitteilungen «Über Clupein» haben K. Felix und Mitarbeiter[1] über die Feststellung berichtet, daß in dem von ihnen untersuchten Präparat von Clupeinmethylester-hydrochlorid neben Arginin, Alanin, Valin, Serin und Prolin als den schon bekannten Haupt-

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