likewise abundant¹. The resemblance of the secretion to silk recalls Trim's comparison of the protein-chitin complex of the insect cuticle with silk². It has been suggested that the lipid material from the general epidermal gland cells of centipedes, having been extruded over the surface of the cuticle, undergoes some change which renders its outer surface hard and inert¹. Since the secretion from the sternal and telopodal glands appears to be a similar substance and possesses the property of spontaneous hardening, this suggestion may receive further support. A similar relation between the general and special tegumental gland secretion and the outer layers of the cuticle has been demonstrated in certain Crustacea^{6,7}.

It is hoped to publish a full account of these specialized glands in centipedes, together with notes as to their possible function, in the near future.

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'Infra-Red' Brooding and the Crooked-Toe Problem in Chicks

LAST season, following the reports that rearing under the bright emitter type of 'infra-red' lamp caused an increased incidence in chicks of a crooked-toe deformity, we reared several hundred chicks from our own stock on solid floors so that we could study the problem at first hand. Despite the fact that we did everything possible to induce the condition, for example, varying the height of the lamp above the chicks, damping the litter, and using various diets, we failed to produce a single case of crooked toe.

Towards the end of the season, with the co-operation of the National Agricultural Advisory Service, we were able to obtain some growing birds from an outside source, which had been reared under 'infra-red' and which showed the deformity. Although these birds were obtained primarily for X-ray examination, they were reared to maturity and bred from for experimental purposes.

Chicks, apparently normal on hatching, from the crooked-toed parents have been reared along with some of our own chicks under the same 'infra-red' lamp, and whereas 100 per cent of the progeny from the crooked-toed parents have developed the deformity, our own chicks have remained quite normal. When second batches of chicks from both sources were reared together, using ordinary electrical heating, neither the progeny from the crooked-toed parents nor our own stock developed the malformation.

It would therefore appear that this particular type of crooked toe is of a hereditary nature, the susceptibility being inherited by some strains whereas others are resistant. The indication is that the manifestation of this type of crooked toe appears in susceptible strains of chicks under the particular environmental

conditions provided, possibly by the combination of bright emitter 'infra-red' lamps—or perhaps prolonged exposure to artificial light—with rearing on solid floors.

If this is the case, then it would appear that certain non-susceptible strains of chicks can be reared successfully under luminous 'infra-red' lamps without the risk of crooked toe deformity appearing; and starting with a 'susceptible' strain it should be possible, by selection, to breed for resistance to the development of crooked toes under 'infra-red' rearing.

While cases of crooked toe in chicks have been previously reported, this hereditary relationship to 'infra-red' brooding has not hitherto, so far as we are aware, been described.

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Sulphinylureas and Sulphenylureas

THE interaction of aromatic ureas with carboxylic acid chlorides in pyridine solution under restrained conditions yields N-carbonyl-N'-arylureas¹. The corresponding reaction with sulphonyl chlorides, however, occurs with simultaneous dehydration and formation of N-arylsulphonyl-N'-arylethanamides². In continuation of the latter work, the action between aromatic ureas and sulphinyl chlorides has been studied. The results obtained necessitated the examination of the corresponding reaction involving sulphenyl chlorides.

Unlike sulphonyl halides, which appear to attack the substituted urea molecule at the oxygen atom (2), forming unstable intermediate O-sulphonylureas [$RNH.C(=NH).OSO_2R'$]^{2,3}, sulphinyl chlorides substitute at the nitrogen (3), yielding N-arylsulphinyl-N'-arylureas (I) as one of the main products. Considerable quantities of N-arylsulphenyl-N'-arylureas (II), presumably formed by an oxidation-reduction mechanism operating during the reaction, are also isolated. Both products of the reaction are oxidized by alkaline permanganate to sulphonylureas of known formula (III); this observation establishes the structures of the sulphinyl- (I) and sulphenyl-ureas (II); hydrolytic fission of the compounds under various conditions provides further evidence in support of the suggested formulae. Finally, N-arylsulphenyl-N'-arylureas are found to be almost the exclusive products of the interaction of arylureas and sulphenyl halides.

Thus, for example, the interaction of phenylurea (1 mole) and toluene-*p*-sulphinyl chloride (2.5 moles) in pyridine at 45° for five minutes gave lustrous