shown that West African *D. chrysippus* are poor storers of cardenolides compared with *D. plexippus* and East African *D. chrysippus*. These workers demonstrated a genetic element in the relative failure of *D. chrysippus* to store cardenolides establishing that this was not merely a reflection of the cardenolide content of their food plants. In view of the particularly poor cardenolide storage capacity of West African *D. chrysippus*, ROTHSCHILD et al.[26] were led to wonder how these butterflies retain their aposematic life-style and they suggested that some other deterrent factor, apart from cardenolide storage in the adult butterfly, is involved. This other deterrent may be the pyrrolizidine alkaloids stored primarily by male butterflies.

Our results (Tables III and IV) indicate, at least in the case of *D. plexippus*, that female danaines are capable of storing pyrrolizidine alkaloids. However females rarely feed on pyrrolizidine alkaloid-containing plants so that, in areas where the butterflies lack cardenolides and require pyrrolizidine alkaloids for distastefulness, they may depend on their similarity to the males for protection from predators. In these areas a scarcity of Batesian mimics might be expected since the unpalatable males would be less able to support a population of palatable mimics as well as conspecific females. This may help to explain the apparent scarcity of *D. chrysippus* mimics in West Africa[26,27].

The relative importance of pyrrolizidine alkaloids and cardenolides in conferring distastefulness on the Danainae remains to be assessed. Genetic selection favoring pyrrolizidine storage (and perhaps female feeding) may occur in areas where a high proportion of larvae feed on plants lacking cardenolides. In these regions the alkaloids may contribute significantly to the unpalatability of the butterflies while in others they may serve only to augment that conferred by cardenolides.

Investigations on the Toxic Effects of Bayer 73 (Bayluscid WP) on Eggs and Yolk-Sac Larvae of *Tilapia leucosticta* (*Cichlidae*)

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Summary. The toxic effect of Bayer 73 on larvae of *Tilapia leucosticta* shows a sharp increase from the day of hatching to the end of the yolk-sac stage. Different degrees of deformity appear in the course of development.

In many tropical waters, Bayer 73 is used to combat Bilharziosis. It kills the intermediate hosts (snails, snail-spawn) and also the parasite in its developmental stages. The preparation is introduced directly into the water (concentration 1 ppm[2,3] and 4–8 ppm · h[4]). Unfortunately it also effects the fish populations, an important food supply for the people[5–7]. Since the effect of molluscicides on fry is not yet known, I have examined the toxic effect of Bayer 73 on eggs and various developmental stages of *Tilapia*. For this purpose, the fertilized eggs were removed from the mouth of the brooding female and artificially incubated (25 °C). Thus the development of more than 2000 eggs and yolk-sac larvae could be tested. As early as the 5th day after the fertilization, the embryos hatch. On the 14th day the yolk-sac larvae become alevins. Between the 3rd and 14th day batches of 20–40 eggs or yolk-sac larvae were dipped for 60 min into well-oxygenated glass tubes containing different concentrations of Bayer 73 (0.5–15 ppm), then rinsed with distilled water and put back into the incubator. There the further development was observed for 15 days and the dead and

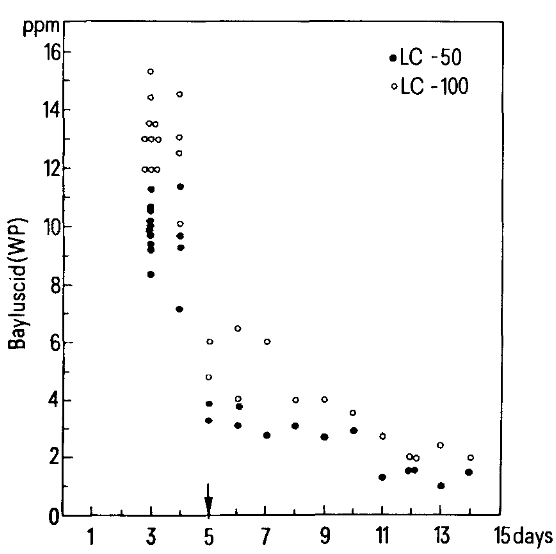

Fig. 1. LC-50 and LC-100 values of the dipping tests with eggs and yolk-sac larvae of *Tilapia leucosticta*. Arrow = hatching day.

[1] This work was undertaken with the aid of Prof. Dr E. Kulzer.

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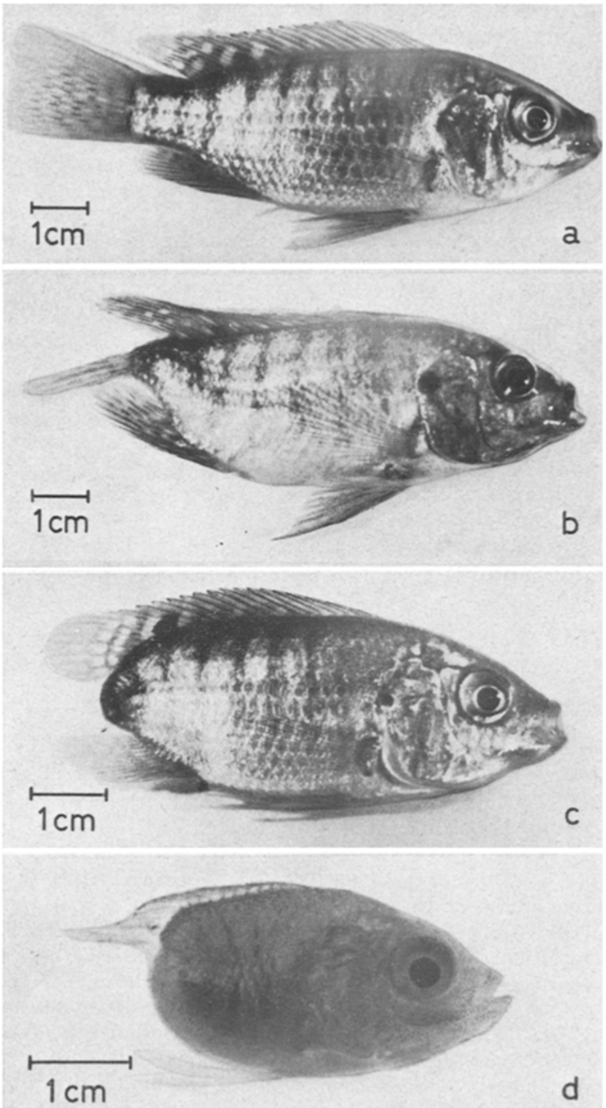

Fig. 2. *a* Regular development; *b–d* progressive malformation.

crippled individuals counted. To evaluate the results the LC-50 and LC-100 methods were used respectively. The toxic effect is represented in Figure 1. It was seen that the fertilized eggs (as long as the egg membrane is intact) are relatively insensitive; 3-day-old eggs showed LC-50 values between 8.4 and 11.4 ppm and LC-100 values between 12 and 15.3 ppm. As development progresses, the sensitivity increases as early as the 4th day (LC-50 7.3–11.4 ppm, LC-100 10.1–14.5 ppm). The toxic effect shows a sharp increase on the 5th day (day of hatching), when concentrations as low as 3–3.9 ppm are sufficient to kill 50% of the yolk-sac larvae within 15 days. In the course of the early development of the yolk-sac-larvae, the sensivity increases further and reaches a maximum (LC-50 1.5 ppm, LC-100 2.0 ppm) at about the 14th day with the end of the yolk-sac stage.

In all experiments, different degrees of deformity appeared in the course of development, which in serious cases resulted in death even before the end of the sac-fry stage. The developmental abnormalities appeared in the region of the abdominal vertebrae (curvature, coalescence of vertebrae, absence of entire groups of vertebrae) and in the region of the anal and caudal fins (Figure 2). From the eggs or yolk-sac larvae dipped on the 3rd, 4th and 5th days of development, up to 37, 31 and 69% of deformed fish respectively emerged, depending on the concentration of the molluscicide. In some cases, even among these deformed fishes, breeding and reproduction was successful.

The young (F1 and F2 generation) developed in a completely normal way. The growth of the fish with serious abnormalities lagged significantly ($p < 0.0002$) behind that of the control fish. The experiments show that there is a high mortality risk for Tilapia immediately after hatching and during the following days, if they come into contact with the molluscicide. The egg membranes prove at first to be a protective barrier. Embryos artificially removed from the egg membranes and exposed to the molluscicide, showed an increased mortality compared with dipped eggs of the same age and with the controls (untreated, normal eggs and embryos removed from the egg membranes). The application of the molluscicide should not, therefore, take place during the early development of the fry in regions where the breeding of *Tilapia* is carried out on a commercial basis.

The Influence of Early Nutrition and Environmental Rearing on Brain Growth and Behaviour[1]

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Summary. Preweaning malnutrition permanently reduced brain size and cellular content but in spite of changes in the adrenocortical stress response no learning deficit was observed. Differential rearing environments did not influence the effects of malnutrition.

Malnutrition retards brain growth and produces behavioural abnormalities[3–7]. In man undernutrition is inevitably accompanied by poor environmental conditions which may be detrimental to future development. Animal studies have shown that environmental factors induce biochemical changes in the brain and alterations in learning ability[8]. FRAŇKOVÁ[9], LEVITSKY and BARNES[10] and BLIZARD and RANDT[4] have demonstrated that such variables influence activity and exploration in malnourished rats. We therefore decided to examine the interaction of malnutrition and environment on brain growth and learning ability. The long-term effects of early malnutrition in rats and subsequent rehabilitation by refeeding and environmental manipulation are reported.

Pregnant Wistar rats whose time of conception was determined by the examination of daily vaginal smears were randomly allocated to control and experimental conditions and placed on a diet containing 23% protein, 56% carbohydrate, 11% fat, together with salts and vitamins, and with a calculated caloric value of 4.1 calories per gram[11]. Malnutrition, consisting of 50% food restriction established by pair-feeding techniques, was imposed from