mutations and chromosome damage. The action of these irradiation by-products (indirect effect) is becoming increasingly important in explaining irradiation phenomena that were once attributed solely to a direct effect (target theory) of ionizing radiation.

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Larval Stages and Phylogeny as Exemplified by the Lung Fluke of Turtles

Embryonic and larval forms as clues to relationships have been criticized largely because their application to phylogeny has been misinterpreted as acceptance of the recapitulation hypothesis of Haeckel. That larval stages may be highly specialized has been well established but, as de Beer (*1*) has stated, "although it can in many cases be shown that these larval forms could not represent the adult ancestral forms, this does not detract from their value as evidence of affinity between the organisms that possess any particular type." That such value not only applies to relationships between phyla and classes but also may extend to less inclusive categories as well is shown in a striking manner by the digenetic trematodes. A larval stage common to all of them is the cercaria (cercariaeum, if tailless) of which there are several types. The discovery that certain very similar adult trematodes have utterly different types of cercariae and that very dissimilar adults may have the same larval type has required drastic revision of existing concepts of relationships and phylogeny within the group. For example, immature stages have demonstrated that trematodes once thought to form a single family, the Heterophyidae, actually belong to three families in two orders (*2*). On the other hand, life-history studies promise to consolidate major groups and, more importantly, indicate lines of descent among them.

It thus was particularly desirable to investigate the life-history of *Heronimus chelydrae,* a common parasite in the lungs of fresh-water turtles and so different from other trematodes that it has long been the sole occupant of a distinct family. It has been found that the miracidium penetrates *Physa* sp. and develops into a sporocyst which produces cercariae directly without the interpolation of an intermediate sporocyst or redial generation, as is the case in most known life-histories. The cercaria differs from the larvae of the paramphistomes only in lacking eyespots and possessing a pair of flame cell groups in the tail. However, these differences are known to occur in larvae belonging to the same superfamily, and the fundamental resemblances between the cercaria of *H. chelydrae* and that of the paramphistomes, especially in the embryology and form of the excretory system, justify the allocation of that species to the superfamily Paramphistomatoidea. The cercaria has a powerful ventral sucker which disappears before the adult stage is attained, and the unique features of that stage, notably the unusual position of the excretory pore and form of the genital glands, may be attributed to differential growth after the cercaria leaves the snail.

From the phylogenetic standpoint, the cercaria of the turtle lung fluke is of much interest. The presence of flame cells in the tail, the posterior position of the definitive excretory pores in that structure, the thin-walled excretory vesicle, and absence of an intermediate generation in the molluscan host are all characteristics that in combination have been reported only for certain fork-tailed cercariae, the larvae of the order Strigeatoidea. Although the amphistomes have been placed heretofore in the order Prosostomata, they thus may be the extant group closest to the trematodes from which the two orders evolved. Furthermore, the life-history of *H. chelydrae* lends support to the view that the fasciolids, echinostomes, and many monostomes, as well as the paramphistomes, trematodes that have never fitted comfortably into the Prosostomata, actually are closer to the Strigeatoidea.

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Effects of Certain 19-Nor Steroids on Reproductive Processes in Animals

In previous publications we have reported that progesterone and certain of its chemical relatives are effective inhibitors of ovulation in rabbits, rats, and women (*1–4*). Among the most potent of a large number of compounds tested in animals have been a series of 19-nor steroids. These have proved to be effective ovulation-inhibitors by both oral and parenteral routes of administration. We have recently concentrated our attention on four of these compounds in a series of studies designed to reveal their action in various mammalian reproductive processes (*5*). The compounds are 17α-ethinyl-19-nortestosterone (I), 17α-ethinyl-5(10)-estraeneolone (II), 17α-ethyl-19-nortestosterone (III), and 17α-methyl-19-nortestosterone (IV).

The following assays with progesterone and these compounds have been performed in female mammals: (A) the Clauberg assay for endometrial stimulation in immature female rabbits, (B) the Rubin assay for uterotrophic activity in immature mice, (C) the deciduomagenic activity in primed, ovariectomized rats, (D) the conception-inhibiting activity in mature female rats caged with fertile males, (E) the ovulation-inhibiting activity in postpartum female rabbits mated to fertile males, and (F) the ability to induce and sustain implantation of the fertilized ovum in female rabbits castrated 1 day after a fertile mating. The details of the methods employed in these assays are being published elsewhere (*6*). In Table 1 we present the calculated minimum effective dose (M.E.D.) in each of the tests. Except where noted in the table, subcutaneous administration of the compounds was practiced.

The data demonstrate, first of all, that each of these compounds possesses progestational activity by virtue of its ability to induce pseudopregnant proliferation in the Clauberg assay (A). Of them II has approximately one-half of the activity of progesterone, whereas I, III, and IV are 5 to 10 times as active.

All of the substances are uterotrophic (B), but they exhibit marked quantitative differences, II being approximately 350 to 400 times as active as progesterone, and III, I, and IV being intermediate in activity. Actually there is a qualitative difference between these compounds in this test in the sense that the slope of the dosage/response curve for I, III, and IV resembles that of progesterone, whereas that of II more nearly resembles that of estrone, and comparison of the curves gives II an activity equivalent to one-fortieth to one-eightieth of that of estrone (*6*). In the spayed female rat test