explanatory. "Complex sequences" refer to seeing or hearing a series of related scenes or sounds—for example, "I saw an expressway and heard cars going across. A few minutes later I saw a whole city from an airplane. It just lasted a second." "Sound of people other than talking" refers to hearing crowds applauding or booing, people scraping their chairs across the floor, and so on.

An example of "unusually warm or cold" is "the little finger of my left hand feels like it is burning." "Depersonalization" refers to feeling dead, parts of the body feeling detached, peculiar loss of bodily sensation, and the like. "Concern about deleterious effects . . ." refers to the report of several subjects that they were getting gangrene or becoming paralyzed in the course of the experiment.

The subjective experiences reported in this experiment appear very similar to, and fully as extreme as, those reported in many of the previously cited studies. Several subjects were convinced of the reality of their hallucinations, and one found the experimental situation so stressful that he was unable to continue the experiment. Since 1 hour is so much shorter than commonly used deprivation periods, the effects reported by our subjects are considered to be due primarily to the subjects' prior knowledge of the anticipated results and to the creation of the attitude "it is appropriate to experience hallucinations in this situation." This interpretation is supported by the findings of Kandel *et al.* (*8*) whose subjects reported unusual visual experiences following "loaded" instructions. It is also of interest to note that the subjects of Hochberg *et al.* (*9*), in a "ganzfeld experiment" carried out before the first studies on sensory deprivation, reported hallucinatory experiences in the visual field but not in other categories of experience. They had been instructed to report continuously on perceived shapes, distances, color, and texture.

Our findings, supported by those of Kandel and Hochberg *et al.*, raise serious doubt concerning the current practice of attributing unusual experiences to one or another dimension of the sensory-deprivation situation. While it is conceivable that 1 hour of sensory deprivation produced the dramatic experiences reported by our subjects, it seems more likely that these experiences resulted primarily from a combination of suggestion and the creation of an attitude concerning the appropriateness of hallucinatory experiences. If so, it is essential that the possible influence of suggestion be allowed for in the design of, and in interpreting the results of, future studies of sensory deprivation (*10*).

C. WESLEY JACKSON, JR.
E. LOWELL KELLY
Mental Health Research Institute and
Department of Psychology,
University of Michigan, Ann Arbor

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All-Female Species of the Lizard Genus Cnemidophorus, Teiidae

Abstract. Six species of lizards in the genus *Cnemidophorus*, Teiidae, have been found to be all-female or virtually all-female. The species are *C. costatus exsanguis* Lowe, *C. deppei cozumelus* Gadow, *C. inornatus* Baird (western population), *C. perplexus* Baird and Girard, *C. tessellatus* (Say), and *C. velox* Springer. It is hypothesized that the explanation of these virtually all-female populations is genetic.

During the summer of 1959 an expedition, under the auspices of the Thorne Ecological Institute and the University of Colorado Museum, was made to the Yucatan Peninsula and Cozumel Island. The primary purpose of the expedition was to collect adequate series of endemic teiid lizards for osteological studies. The party of four, Mr. and Mrs. Herbert Beargie, Christopher Smith, a National Science Foundation participating undergraduate scholar, and I, arrived at Cozumel Island on 26 June and left on 1 July. Because of inclement weather, effective collecting was possible only on 28, 29, and 30 June. During this period, a series consisting of 72 adults and 4 juveniles of *C. deppei cozumelus* was collected. Subsequent internal examination of each individual for testes, hemipenes, oviducts, or ovaries with developing follicles revealed the astounding fact that all 76 specimens were females.

Two possible explanations of this phenomenon can be made. First, it may be assumed that males do exist, that collecting was biased, and that the apparent lack of males has an ecological explanation. Or, second, it may be assumed that, during the breeding season at least, males do not exist, that females reproduce by some parthenogenetic mechanism, and that the explanation of the phenomenon is genetic.

The genus *Cnemidophorus* is notorious for its erratic periods of activity, both diurnal and seasonal. There is some evidence of sexual disparity in this respect as well. Duellman (*1*) reports that during the dry season from November through May adult males of *Cnemidophorus costatus zweifeli* apparently aestivate. Inasmuch as our entire series of *C. deppei cozumelus* was collected during a 3-day period at the end of June, the possibility that in this species too, only females were active at that time of the year, was considered. A series of 35 specimens was borrowed, four from the region of Lake Peten, Guatemala, 30 from Cozumel, and one from Mujeres Island to the north. These specimens, collected at different times of the year, also proved to be females.

An examination of the remaining species in the genus was initiated to determine whether separate seasonal cycles of activity of the two sexes of a species existed elsewhere, and also to check on the sex ratios of the 74 currently recognized forms. It became immediately apparent that the condition found in *C. deppei cozumelus* is not unique.

Five additional species, subspecies, or populations were found which resemble *C. deppei cozumelus* in being predominately or entirely female in structure. These are *C. costatus exsanguis, inornatus* ssp. (western populations), *C. perplexus, C. tessellatus*, and *C. velox*. One male *C. tessellatus* was found in a series of 223 specimens examined, and two juvenile males, questionably allocated to *C. velox*, were found in a series of 104 specimens of that species. The specimens examined constitute large series, collected by various institutions over a long period of time and at all seasons of lizard activity. There seems to be little doubt that in these species some other ex-

planation for the disparity of the sex ratios must be sought.

Subsequent to the discovery of these virtually all-female species it was discovered that the phenomenon had been independently noted by others, namely Minton (*2*) and Tinkle (*3*), in the species *C. tessellatus*.

Parthenogenesis in vertebrates is extremely rare. The first report of the phenomenon occurring naturally in vertebrates was made by Hubbs and Hubbs (*4*). According to their account the poeciliid fish *Mollienisia formosa* occurs in the female condition only. But wherever it occurs it is sympatric with one or the other of two bisexual species of the same genus, *M. latipinna* or *M. sphenops*. They concluded that *M. formosa* was a natural self-perpetuating hybrid of these bisexual species, borrowing the males of these to initiate embryogenesis. They subsequently demonstrated experimentally (*5*) that the males of other species of *Mollienisia*, and less effectively other genera, *Gambusia, Allopoecilia, Limia,* and *Lebistes,* could also induce pregnancies. All such matings resulted in matriclinous young. They further suggested that the species probably is permanently diploid. Mayer (*6*) has confirmed their findings. Other investigators such as C. P. Haskins, E. F. Haskins, and Hewitt (*7*) have been working with this species also, and Miller and Schultz (*8*) are investigating two other all-female poeciliid fish.

One other example of natural parthenogenesis is known in vertebrates and is of particular interest in that it occurs in lizards. The existence of an all-female subspecies, *Lacerta saxicola armeniaca*, in Armenia was first pointed out by Lantz and Cyren (*9*). This phenomenon was corroborated by Darevskii (*10*) who at the same time recognized two additional all-female subspecies of the same species, and then in 1958 (*11*) proved conclusively that in all three races this is true parthenogenesis.

Mertens (*12*), in reviewing this work of Darevskii's, pointed out that peculiar sex ratios are known in some species of gekkos and suggested that possibly here too there may be parthenogenesis.

As can be seen from these accounts, natural parthenogenesis is so unusual in vertebrates that one should proceed with extreme caution before ascribing the lack of males in a species to this phenomenon. The presence of a male in *C. tessellatus* and the apparent presence of two males in *C. velox* and the apparent partition of *C. inornatus* into bisexual and unisexual moieties are conditions that mitigate against the immediate adoption of a parthenogenetic hypothesis. Ecological explanations should be carefully considered first.

During the latter part of the summer of 1959 periodic checks were made for hatchlings of *C. tessellatus* in the field. On 26 August, two juveniles and one adult were collected in Pueblo County, Colorado. Thereafter 60 additional hatchlings and 8 adults were captured. All of these specimens were females. It is possible that hatchling males might exhibit sexual disparity in their behavior and that they were already occupying separate or different habitats. Or they might have been active at different times of the day. These possibilities were kept in mind, and every effort was made to explore all of the obvious available habitats at all times of the day. This evidence, while not conclusive, strongly suggests that the skewed sex ratios in this and the other species mentioned have indeed a genetic explanation (*13*).

T. PAUL MASLIN

Department of Biology,
University of Colorado, Boulder

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Chronic Infusion of Tritiated Thymidine into Mice with Tumors

Abstract. A technique for the chronic infusion of mice is presented. Infusion of tritiated thymidine for 3 to 7 days labels most, but not all, of the cells of autochthonous breast tumors. Many of the unlabeled tumor cells are probably nonproliferating, but some may represent cells with exceptionally long intermitotic times.

The chronic infusion of tritiated thymidine into mice with autochthonous tumors indicates the relationship between cell division and tumor growth.

As shown in Fig. 1, a flexible 1-mm polyvinyl catheter is introduced through the skin of the back, carried subcutaneously to the midabdomen, inserted into the peritoneal cavity, and anchored by two sutures. Heavier, less-flexible plastic tubing is then threaded over the catheter and is anchored to the skin of the back with four sutures. The heavy tubing extends beyond the animal's reach and prevents access to the catheter. The catheter is connected to an infusion pump.

The pump supplied fluid at a rate of 0.06 ml/hr. At the concentration used, 50 μc of tritiated thymidine (Schwarz BioResearch 350 mc/mmole) was infused per 10-hour period. Mice have been infused continuously for 10 days without apparent ill effect, either from the tritiated thymidine or from the experimental manipulation.

As a preliminary study, C3H mice with 12 autochthonous breast tumors were infused for 3 to 7 days. Usually, the animals were allowed to survive 3 to 5 days after infusion was stopped. In one case, an animal with two tumors was killed immediately after a 4-day infusion. The tumors were removed and fixed in neutral formalin immediately after the mice were killed. Autoradiographs were made from 2-μ-thick sections by the dipping method (*1*).

These autoradiographs presented certain problems. For example, background was difficult to define in areas where most cells were heavily labeled. Exposures of up to 200 days—made to separate marginally labeled cells from background—obscured the cytological details of heavily labeled cells. More appropriate exposures for the majority of the cells resulted in some cells with a few grains over them, and there was no assurance that this was due to background, scatter from nearby cells, or marginal labeling. Another possible cause for apparently unlabeled cells