n those reptiles for which they have been reported (*6*). The female is generally considered to be the heterogametic sex in reptiles.

While parthenogenesis and polyploidy are frequently encountered among invertebrates, often in association with each other, they are seldom observed in higher animals, and in no previous instance have they been demonstrated to occur together throughout a natural, self-reproducing population of vertebrates.

This condition is reported to be approached in two genera: in *Lacerta*, the Old World counterpart of the American genus *Cnemidophorus*, and in salamanders of the genus *Ambystoma*. Triploid individuals are produced by natural hybridization between bisexual and diploid parthenogenetic forms of *Lacerta saxicola* (*7*), but triploid hybrid offspring resulting from this union possess rudimentary gonads and appear to be sterile. Populations of triploid females in the *Ambystoma jeffersonianum* complex are capable of producing viable eggs, but the eggs do not develop unless stimulated by sperm from diploid males (*8*). The sperm are not believed to contribute chromosomes to the triploid nucleus.

There are no reports of the hatchling *Cnemidophorus* being produced by an individual hatched and reared in complete isolation. While such conclusive evidence is lacking, the term parthenogenesis is here used without qualification because all available evidence supports the viewpoint that the all-female populations of *Cnemidophorus* are parthenogenetic rather than gynogenetic as in the case of triploid *Ambystoma*. The number of specimens thus far karyotyped, the normal appearance of their ovaries on gross examination, and the apparent absence of logical parental candidates for interspecific crosses at some of the collection sites provide a reasonable basis for the tentative assumption that these individuals are not sterile hybrid offspring such as those reported in *Lacerta*.

Vertebrate systematists have seldom been faced with the difficult problem of placing asexual populations within a taxonomic framework designed for sexually reproducing organisms. The significance of triploidy to this problem cannot be properly evaluated until it is established in each case whether triploidy arose within a single species, or resulted from hybridization between two different species. Likewise, the significance of triploidy for an understanding of the genetics of the parthenogenetic forms cannot be discussed with any degree of authority until it has been determined whether an ameiotic or meiotic form of oogenesis is involved.

LEWIS A. PENNOCK

Department of Biology,
University of Colorado,
Boulder, 80304

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Blepharisma intermedium: Ultraviolet Resistance of Pigmented and Albino Clones

Abstract. *An albino mutant of* Blepharisma intermedium *is much more sensitive (on the basis of time to regeneration of transected cells) to short-wavelength ultraviolet radiation than the wild type (containing a reddish pigment) from which the mutant derived. In the wild type, absorption of ultraviolet light by the pigment present in the outer surface of the cell presumably reduces the intensity of the radiation impinging on the vulnerable interior.*

Blepharisma intermedium contains a reddish pigment thought to be a hydroxy derivative of mesonaphthodianthrone (*1*). When present in high concentration in *Blepharisma* (for example, in cells grown in dim light or darkness) this pigment acts as an intracellular photosensitizer to intense visible light; when externally applied in extracts to colorless cells it induces damaging photooxidations (*2*). The function of the pigment in the outer

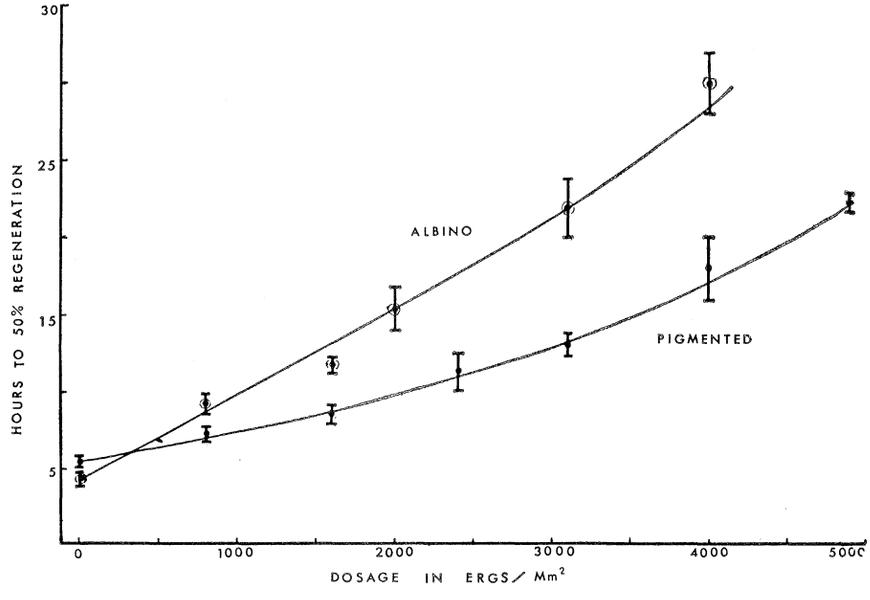

Fig. 1. Regeneration times for albino and pigmented clones of *Blepharisma intermedium*, Rao-A stock, irradiated with ultraviolet. Points are means for series, each of three to six experiments, with one standard deviation.

surface of the cell has not been ascertained; it may protect against ultraviolet radiation, since more deeply pigmented races are generally more resistant to ultraviolet than less deeply pigmented ones (*3*).

Appearance of an albino mutant *B. intermedium* of the Rao-A stock made it possible to compare the resistance to radiation of pigmented and albino clones. Greater resistance in the pigmented than in the albino clone would suggest that the pigment is a screen protecting the cell from short-wavelength ultraviolet radiation. Conversely, less resistance in the pigmented than in the albino clone would suggest that in the colored clone the pigment acts as a photosensitizer to ultraviolet, as it does to intense visible light.

The albino and red clones of the Rao-A stock were both grown on a single strain of bacteria in continuous yellow light at 25°C. Individuals in the same nutritive condition were tested with various dosages of low-intensity (about 4 to 8 erg mm^{-2} sec^{-1}) ultraviolet light at wavelength 2654 Å from a monochromator (*4*). The rate of regeneration, a sensitive indicator of the action of ultraviolet radiation (*4*), was used to compare effects on the two clones. Posthypostomal pieces of pigmented *Blepharisma* at 25°C recover their mouth parts and form food vacuoles within about 5 hours (5.3 ± 0.3 hr) after removal of the hypostome; radiation prolongs the regeneration time (*4*).

Times for 50-percent regeneration of the pigmented and albino clones after various ultraviolet dosages (*5*) are compared in Fig. 1. The albino clone is not only much more sensitive to radiation than the pigmented clone but is also the most susceptible *Blepharisma* ever tested (*3*). Thus it appears somewhat a paradox that the very pigment that photosensitizes pigmented *Blepharisma* to intense visible light apparently acts as a protective screen against short-wavelength radiation. None of the data presented, however, exclude the possibility that the mutation from pigmented to albino may be accompanied by a loss in a repair mechanism; such loss, rather than lack of a screening pigment, might explain the decreased resistance of the albino.

Electron-microscope studies of pigmented and albino clones (isolated from an unnamed species of *Blepharisma* but subsequently lost) indicate the presence of similar granules in both—with possibly some modification in the albino (*6*). It is therefore likely that the mutation from pigmented to albino form involves a gene that determines an enzyme concerned with synthesis of the pigment but not necessarily with elimination of the granules. The albino clone, the subject of this report, has not yet been studied with the electron microscope.

The pigment of *Blepharisma* absorbs visible as well as ultraviolet light and is bleached by the latter (*7*). In ponds it may serve as a protective screen against solar ultraviolet, perhaps enabling *Blepharisma* to occupy otherwise untenable habitats. Little is known of the ecology of *Blepharisma* (*8*).

ARTHUR C. GIESE
Department of Biological Sciences, Stanford University, California

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Cycasin: Radiomimetic Effect

Abstract. *Cycasin, methylazoxy-methanol-β-glucoside, a carcinogenic compound that occurs naturally in cycad plants, induces chromosome aberrations in the root-tip cells of* Allium cepa. *Germination and growth in an aqueous solution of cycasin at a concentration of only 3 percent of that found in* Cycas circinalis *induced as many aberrations in chromosomes as did about 200 roentgens of gamma irradiation.*

It has been demonstrated that parts of the cycad plant and the compound cycasin isolated from tissue of *Cycas circinalis* L. are acutely toxic and induce neoplasms in experimental animals (*1, 2*). Cycasin is methylazoxymethanol-β-glucoside (*3*). Several "neocycasins" having the same aglycone but different sugar moieties have been recognized (*4*).

It has long been known that various agents can produce radiomimetic and carcinogenic effects (*5*). We tested cycasin (*6*) for radiomimetic effects on plant chromosomes, as measured by the induction of aberrations in chromosomes.

An aqueous solution of cycasin, 5 mg in 10 ml, was poured over several layers of filter paper in a petri dish and 100 onion seeds (*Allium cepa* var. Dowing Yellow Globe) (*7*) were sown on the paper. Other seeds sown on filter paper moistened with water served as controls; some of the controls were given an acute dose of 260 r of gamma rays when the root tips were about 0.2 cm long. Some root tips from each batch were fixed in a mixture of alcohol and acetic acid when the roots were about 0.7 cm long; others were fixed the following day when the roots were about 1.5 cm long. Acetocarmine smears were made for cytological analysis. Chromosome aberrations (Table 1), scored at anaphase, included dot deletions, rod deletions, and chromatid and chromosome bridges.

Aberrations found in the controls result from natural aging of the seeds. As seedling roots increase in length the aberrations, caused by aging or by acute radiation, decrease in frequency

Table 1. Numbers of chromosome aberrations induced in cells of onion root tips by germination and growth in cycasin solution or by gamma irradiation.

Root length, fixed (cm)	Cells scored (No.)	Aberrations (No.)	
		Total	Per 100 cells
Onions grown in water (controls)			
0.7	426	17	4
1.5	416	12	3
Onions grown in cycasin solution			
0.7	898	90	10
1.5	352	116	33
Roots irradiated (260 r) after growth in water			
0.7	802	353	44