TABLE I

Lower Devonian	Littleton formation	Slate, sandstone and volcanics. 5,000 feet
Middle Silurian	Fitch formation	Calcareous shale, calcareous sandstone, arenaceous dolomite, arkose, quartz conglomerate. 700 feet
Lower (?) Silurian	Clough conglomerate	Quartz conglomerate and quartzite. 0–200 feet
	—— Unconformity ——	
Upper Ordovician (?)	Partridge slate	Black slate 0–2,000 feet
	Ammonoosuc volcanics	Chlorite and sericite schists of volcanic origin. 2,500 feet
	Albee quartzite	Quartzite and slate. 4,000 feet

gests that they are younger than the fossiliferous Middle Ordovician of eastern Vermont and therefore Upper Ordovician.

The paraschists between the Ammonoosuc and Pemigewasset Rivers, which in 1931 were believed to be pre-Cambrian, are now known to belong to these same six stratigraphic units, but in a higher stage of metamorphism. The slates and sandstones of the Littleton formation have become mica schists, garnet schists, staurolite schists, and, further to the southeast, sillimanite schists. The volcanics of the Littleton and Ammonoosuc formations, which are chlorite schists and sericite schists northwest of the Ammonoosuc River, are amphibolites and fine-grained biotite gneisses to the southeast. In the Fitch formation the calcareous shales have become biotite-calcite schists and the arenaceous dolomites now consist of actinolite, pyroxene, plagioclase and quartz. Similar changes occur in the other formations, except the Clough conglomerate, which is merely more coarsely crystalline.

Our mapping of the Moosilauke quadrangle demonstrates that the mica schists, garnet schists and sillimanite schists of Mt. Moosilauke are metamorphosed Devonian rocks. Reconnaissance work indicates that the sillimanite schists of the Presidental Range and elsewhere are likewise metamorphosed Devonian. It is very probable that most of the metamorphosed sedimentary rocks between the Pemigewasset River and the Maine border are Silurian and Devonian.

Four major periods of intrusive igneous activity have been recognized in central New Hampshire—the Highlandcroft, Oliverian, New Hampshire and White Mountain petrogenic cycles. The rocks of the Highlandcroft cycle include diorite, quartz diorite, granodiorite and granite. They are younger than the Partridge slate, but older than the Clough conglomerate. They are thus definitely pre-Silurian, and if the tentative assignment of the Partridge slate to the Upper Ordovician is correct, the Highlandcroft petrogenic cycle is Late Ordovician. The Oliverian rocks consist largely of biotite granite and are younger than the Lower Devonian but older than the major period of orogeny. The rocks of the New Hampshire magma series consist of diorite, quartz diorite, granodiorite, trondhjemite and granite. They are younger than the Lower Devonian and essentially contemporaneous with the great period of folding. Youngest of all are the rocks of the White Mountain ("alkaline") magma series, which are younger than the Lower Devonian and also later than the period of orogeny.

Thus three of the igneous series are younger than the Lower Devonian. To these three groups belong 90 per cent. of the igneous rocks of central New Hampshire. The other 10 per cent., the Highlandcroft group, is pre-Silurian and probably Late Ordovician, although the possibility of a greater age can not be definitely eliminated on the basis of the present data. On the recent geologic map of the United States only the rocks of the White Mountain magma series are shown as Paleozoic. All others were included under the symbol for the pre-Cambrian. In other words, Paleozoic intrusives are much more abundant than the map shows.

It is quite impossible to prepare a satisfactory geologic map of New Hampshire at the present time. No complete survey of the state has been made since the Hitchcock survey in the seventies. Although an excellent piece of work for its time, it can not be used as an adequate basis for a modern map. Fortunately the state is now completely mapped topographically and the geologic mapping of five quadrangles is now well advanced, and publication of the memoirs now in preparation should give definition to our present picture of Paleozoic history in this area.

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GLOSSARY OF TERMS USED IN DESCRIBING WOODS

THE December issue of *Tropical Woods,* published by the Yale School of Forestry, New Haven, Conn., contains a report by the Committee on Nomenclature of the International Association of Wood Anatomists on the standardization of terms used in describing woods. It is in the form of a glossary in which 126 terms are enumerated and succinctly defined.

The members of the committee are Professor Arthur J. Eames, Cornell University; Professors Irving W. Bailey, Ralph H. Wetmore and Robert H.

Woodworth, Harvard University; Professors George A. Garratt and Samuel J. Record (chairman, and secretary of the association), Yale University. About 20 other members of the association assisted in the work, which had its beginning at a conference of wood anatomists at Cambridge, England, in August, 1930.

With the backing of the association, the committee did not hesitate to make old terms more specific or to discard and replace names that were considered inappropriate or misleading. Thus *bars* and *rims of Sanio* are replaced by *crassulae; pits with cribiform membranes,* by *vestured pits; interxylary* and *intraxylary phloem,* by *included* and *internal phloem,* respectively; *conjugate cell* by *disjunctive cell; intermediate* or *substitute wood fiber,* by *fusiform wood parenchyma cell.* Among the various new terms are *pit-pair, pit annulus, blind pit, vasicentric tracheids, perforation plate* and *tylosoid.* There are precise definitions of *middle lamella, primary* and *secondary cell walls* (the committee does not recognize a *tertiary* wall), and of the different types of parenchyma and of pore arrangements. More than 100 of the terms have already been adopted as standard for the International Association of Wood Anatomists.

The report has been reprinted as a pamphlet of 12 pages, including notes and explanations, and may be obtained from the Yale School of Forestry for 10 cents apiece for single copies, with special discounts if ordered in quantities of 10 or more. Eleven hundred copies have already been sold.

SAMUEL J. RECORD

AUTOGAMY IN PARAMECIUM AURELIA

THE first intimation of orderly, deep-seated reorganization processes in *Paramecium aurelia,* apart from conjugation, was given by Woodruff and Erdmann.[1] Since that time, numerous researches have shown the wide-spread occurrence of rather profound internal readjustments, without cell fusion, in other species of ciliated protozoa.

This preliminary note records the occurrence of autogamy in the life history of several different races of *Paramecium aurelia.* Autogamy, as it has been worked out during the past three years—both from mass cultures and from animals bred in daily isolation cultures—is the counterpart, in a single individual, of the complex nuclear changes which are effected during conjugation. In the latter process two animals come together, and, following three maturation divisions of the micronuclei, gamete nuclei are formed. Two of these fuse to form a synkaryon which gives rise to a new nuclear apparatus. The old macronucleus, which has degenerated, is thus replaced by a new one of micronuclear origin.

In autogamy, the same type of reorganization as conjugation is effected by a single animal. At the time of the first micronuclear division in autogamy, the two small micronuclei increase tremendously in size, develop an elongated, thin, crescent-like form and later transform into large metaphase spindles. Two other divisions follow, whereby the gamete nuclei are formed. Since these three divisions are the exact duplicates, as far as can be determined, of those formed in conjugation, they are interpreted as meiotic divisions. Two of the gamete nuclei of the single animal undergoing autogamy fuse to form a synkaryon. This divides twice to produce four nuclei. Two of them become macronuclear anlagen while the other two remain small and undifferentiated, the two functional micronuclei. The macronuclear anlagen are distributed to two daughter cells at the time of the first cell division, at which time the micronuclei divide. The old macronucleus disintegrates, at about the time of the formation of the gametic nuclei, by elaborating a skein of chromatin-ribbons. This skein later divides transversely into a large number of sausage-shaped fragments which round up and are eventually resorbed into the cytoplasm. In autogamy, then, a new nuclear apparatus is reconstituted from the activity of a synkaryon produced by the gamete nuclei of a single individual.

Preliminary observations on *Paramecium caudatum* and *P. multimicronucleata* suggest the occurrence of autogamy in these species also.

Since autogamy involves maturation and fertilization and hence may be regarded as a sexual process, its genetic consequences—the introduction of heritable variation into the species—would be expected to be of the same order as those of conjugation.

In addition to this sexual process of autogamy, bringing about a drastic cellular reorganization, evidence has been accumulating as to the existence of a purely asexual reorganization process in *P. aurelia,* in which the macronucleus alone is involved. Further details of both processes will be published shortly.

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[1] L. L. Woodruff and Rh. Erdmann, "Complete Nuclear Reorganization without Cell Fusion in Paramecium," *Jour. Exp. Zool.,* 17, 425–518, 1914.

CATARACT AS A RESULT OF DIETARY DEFICIENCY IN LARVAL AMBLYSTOMA TIGRINUM

IN larvae of the tiger salamander being reared on a series of highly purified milk-powder-casein diets, the lenses of the eyes turned milky-white in mid-larval life and passed through stages like those of "senile" cataract of the cortical type. At the stage