and its management is the highest test of his capabilities. Every species from a single locality, in whatever permanent collection it may be, should be registered upon a separate card giving name, systematic position, terrane, locality, number of specimens, source whence obtained, place of disposition in museum, museum register number, and, if a type published or even a specimen especially referred to in a publication, an exact reference should be given to page and plate. Such cards should be arranged alphabetically, and without regard to any other classification. By the aid of this catalogue, the curator is in the position to know just what material the museum has in stock, and can respond promptly to requests for the loan of material, since the place of any specimen can be ascertained at once. The bulk of the fossil collections being arranged stratigraphically, faunal geologists and paleontologists will be able to secure promptly any desired information without the necessity of referring to the catalogues, while other students of extinct life can refer to any or all the species of a group in the museum by the aid of the catalogues. The cards of this catalogue in use in the U. S. Museum are $4\frac{1}{2} \times 6\frac{3}{4}$ inches.

Additional aid can be given the systematic biologist by providing a generic catalogue grouped into classes. Only those genera of which there is material in the museum will have representation in this catalogue. On these cards may also be given the type species and its locality and the place of original description.

The *Duplicate collection* exists for exchange purposes only, is constantly changing, and requires no attention except in the matter of preservation of identifications.

In *Recording the specimens* in the U. S. National Museum, each lot of fossils is given a general accession number as soon as received, and later, when the material has been studied, each species from a single locality is given a permanent '*museum register number*.' The latter, when practicable, is written upon each specimen, and opposite this number in the record book is entered the name, locality, date and any remarks pertinent to its history. To fossils brought together by the U. S. Geological Survey are attached small, round, green or yellow tickets, upon which are written numbers referring to the '*locality book*.' This method is preliminary to permanent record. Either system permits the assembling in one tray for study, all the material of a species from many localities, without danger of confusing their history. "Specimens can be named at any time, but the locality once lost, the object becomes comparatively valueless. The record of donors should be accurate and complete so that the specimens from any given source can be traced at once to their location." *

Types and illustrated specimens should have in addition to the museum register number, some conspicuous mark to call attention to their great scientific value, and to guard against loss. In the U. S. National Museum a small, green, diamond-shaped ticket is pasted on each specimen; this being a method long in use by Prof. James Hall.

CHARLES SCHUCHERT.
U. S. NATIONAL MUSEUM,
WASHINGTON, D. C.

THE FLOW OF THE CONNECTICUT RIVER.†

THERE is a general and doubtless well-founded belief that the cutting of the forests is injurious to the flow of the streams whose basins are thus denuded. This belief is based upon the common experience of men long familiar with the streams in question, and is also supported by theory. Few opportunities, however, exist for definitely measuring the effect that is produced, for the reason that upon very few streams have

* Goode. (loc. cit., p. 58.)

† Read before the American Forestry Association, 1895.

reliable and long-continued observations of discharge been made. Your Association meets this year upon the banks of the Connecticut river, upon whose upper drainage area the clearing away of the forests has been for many years, and still is, progressing. At two points upon this river, Hartford and Holyoke, an unusual number of continuous observations of flow have been made, and it has seemed to me desirable to examine them and see whether they reveal any changes in the character of the flow which could be ascribed to the cutting of the forests.

At Hartford the tributary area is about 10,200 square miles, and for a period of over fifty years records are available of the maximum freshet height of each year. Further, observations to determine the daily rate of discharge were begun in 1871 by General Theodore G. Ellis, and were continued without interruption until 1886, although for 1882 and 1883 the figures are not at hand. There was thus obtained a record having few parallels in this country, and it is deeply to be regretted that the United States engineers should have permitted it to be discontinued, as was done in 1886. At Holyoke, where the drainage area is about 8,000 square miles, the Holyoke Water Power Company has maintained since 1880 a daily record of the discharge of the river past that point, which record is still continued and is on the whole the most valuable that now exists regarding the discharge of this stream.

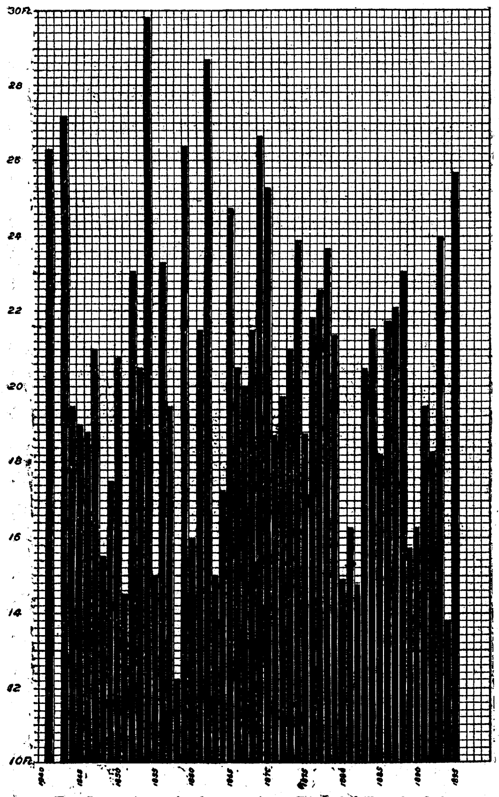
The effect of forest cutting within the past twenty-five years should, of course, be most evident in the upper river, since it is near the head waters that operations have been mainly conducted in that period. It will be of interest, however, to study the only records that are available—those for the lower river—and see if we can there detect any marked change in the nature of its flow.

The theory as to the effect of forests is, that by shading the ground they tend to prolong the melting of snow in the spring, and thus to prevent excessive freshets, as well as to maintain the naturally decreasing flow of late spring and early summer. Further, by reducing the evaporation from the ground, by obstructing the free flow of surface water after rains, as well as by conserving the snows, they tend to maintain a large volume of ground water, which, issuing in visible springs or in invisible seepage, must of course be the reliance of all streams in dry weather. The effect of extensive forest-cutting might, therefore, be expected to be an increase in the number, suddenness, and height of oscillations, and on the other hand a more speedy falling away in summer and a lower range of dry weather flow. To reveal clearly any permanent change that may have taken place in the Connecticut river it seems to me that we should have continuous records of flow for a longer period than they are yet available, and that for successive groups of years curves should be constructed, by averaging for each group the lowest daily discharge, the second lowest, and so on, irrespective of calendar order. The distribution of the flow would thus be shown in a manner warranting the drawing of positive conclusions. Because the labor involved in such a treatment is large, and because the records cover so short periods as hardly to warrant it, I have limited myself to an examination of freshet heights and of low-stage flow.

The heights above low water datum to which the river has risen in freshets at Hartford since 1840 are as follows :

	1841......26.3	Apr.	1869......26.7
	1843......27.2	"	1870......25.3
Dec.	1844......19.5	May	1871......18.7
Apr.	1845......19.0	Apr.	1872......19.7
Mar.	1846......18.8	"	1873......21.0
Apr.	1847......21.0	Jan.	1874......23.9
Jan.	1848......15.5	Apr.	1875......18.7
Nov.	1849......17.5	"	1876......21.8

May	1850......20.8	Mar.	1877......22.6
Jan.	1851......14.5	Dec.	1878......23.7
Apr.	1852......23.1	May	1879......21.4
Nov.	1853......20.5	Apr.	1880......14.9
May	1854......29.8	May	1881......16.3
Jan.	1855......15.0	"	1882......14.8
Aug.	1856......23.3	Apr.	1883......20.5
Feb.	1857......19.5	"	1884......21.5
Mar.	1858......12.3	"	1885......18.2
"	1859......26.4	May	1886......21.8
"	1860......16.0	Apr.	1887......22.1
Apr.	1861......21.5	May	1888......23.1
"	1862......28.7	Nov.	1889......15.7
May	1863......15.0	Oct.	1890......16.3
Apr.	1864......17.3	Apr.	1891......19.5
Mar.	1865......24.8	Jan.	1892......18.3
Feb.	1866......20.5	May	1893......24.0
Apr.	1867......20.0	Apr.	1894......13.8
Mar.	1868......21.5	"	1895......25.7



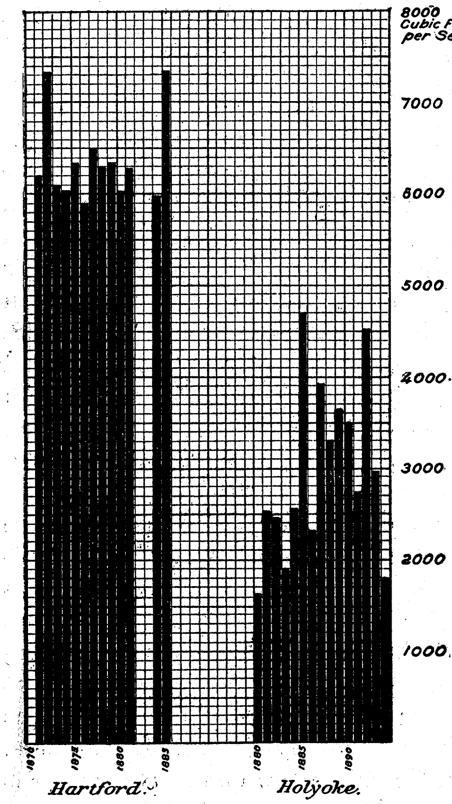
Freshet Heights in Connecticut River by Hartford Gauge.

Averaged for successive periods these give:

1841–49	Average	height	.......20.6	(1842 missing.)
1850–59	"	"	.......20.5	
1860–69	"	"	.......21.2	
1870–79	"	"	.......21.7	
1880–89	"	"	.......18.9	
1890–95	"	"	.......19.6	

An examination of these figures and of a graphical representation of the yearly freshet heights discloses, it seems to me, no permanent change. The highest freshet was in 1854, the lowest in 1858, and only twice has the height of 27.7 feet attained in 1801 been exceeded. Apparently there was a gradual increase in the *average* height down to 1880, while at the same time there was a marked and steady decrease from 1854 to 1880 in the heights of the more extreme freshets.

In considering the dry weather discharge of the river I have taken as a basis for comparison the average flow for the lowest consecutive period of four weeks in each year, for which I find the following figures, which have also been plotted to scale:



Low Water Flow in Connecticut River.

Connecticut Rive t Hartford.

	Avg. discharge in cu. ft. per sec. for lowest 4 weeks period.
Sept. 9—Oct. 6, 1871	6200
Feb. 11—Mar. 9, 1872	7330
Aug. 25—Sept. 21, 1873	6090
Oct. 24—Nov. 20, 1874	6020
Jan. 6—Feb. 2, 1875	6330
Aug. 11—Sept. 7, 1876	5900
Jan. 1—Jan. 28, 1877	6490
Sept. 25—Oct. 22, 1878	6280
Oct. 5—Nov. 1. 1879	6350
Sept. 30—Oct. 27, 1880	6020
Sept. 22—Oct. 19, 1881	6270
Sept. 8—Oct. 5, 1884	5960
Sept. 17—Oct. 14, 1885	7320

Connecticut River at Holyoke.

	Avg. discharge in cu. ft. per sec. for lowest 4 weeks period.
Aug. 22—Sept. 8, 1880	1620
Sept. 19—Oct. 16, 1881	2510
Aug. 20—Sept. 16, 1882	2470
Sept. 2—Sept. 29, 1883	1890
Sept. 7—Oct. 4, 1884	2550
Feb. 28—Mar. 27, 1885	4690
Aug. 27—Sept. 24, 1886	2310
Sept. 23—Oct. 20, 1887	3930
July 16—Aug. 12, 1888	3290
Aug. 21—Sept. 17, 1889	3640
July 26—Aug. 22, 1890	3500
Sept. 23—Oct. 20, 1891	2740
Sept. 10—Oct. 7, 1892	4520
Jan. 12—Feb. 8, 1893	2970
Aug. 19—Sept. 15, 1894	1800

In these figures no change for the worse appears in the dry weather flow; in fact, the Holyoke diagram displays a general improvement from 1880 to 1893. It is true that this improvement may have been due to increased reservoir facilities on the tributaries of the main river, the artificial control thus exercised over the stream tending to modify and disguise all natural changes so as to increase the difficulty of drawing accurate conclusions.

Even though an unfavorable change were apparent in the lower water volume, it would be necessary, before assigning a cause for it, to study the rainfall of the basin for the period in question and to consider what the probable influence of that had been; but, as it is, such a study seems unnecessary and my general conclusion is, that so far as the flow of the lower river is concerned, no permanent change for the worse in the past twenty-five years is apparent. In closing I desire to express my indebtedness to Mr. F. H. Newell, Secretary of this Association, for placing at my disposal valuable data regarding the discharge of the Connecticut river; and to call attention to the importance of the work being done by the United States Geological Survey in attempting to obtain continuous records of the flow of many of the rivers of this country.

DWIGHT PORTER.
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON.

AMERICAN AMBER-PRODUCING TREE.

THE world's supply of amber in all ages appears to have been drawn from the shores of the Baltic, where it is still mined or cast up by the waves in commercial quantities. Amber occurs also in numerous inland localities throughout Europe, as in the vicinity of Basle, Switzerland, and in France and England. It is also found on the coasts of Sicily and the Adriatic.

Up to the present time amber has not been found in North America in commercial quantities, although it is known from a number of widely scattered localities. It appears to have been first reported by Dr. G. Troost from Cape Sable, Magothey River, Maryland, in 1821.* It has also been found in small quantities near Cañon Diablo, Arizona; near the Black Hills, in South Dakota; Gay Head, on Martha's Vineyard; Trenton and Camden, New Jersey; Chesapeake and Delaware Canal, and a number of more or less doubtful localities.

The Cape Sable locality has been visited several times recently by Mr. Arthur Bibbins, instructor in geology in the Woman's College of Baltimore, and a careful search made for the amber.

This place is somewhat difficult of access from Baltimore, and the visits to it were made possible by the courtesy of Dr. W. L.

* Am. Journ. Sci., Vol. III. 1821. pp. 8–15.