

*ebenoides* from Jefferson. While all these need further verification, there is no reason apparent why they should be thus limited, though the last named species is always a rare and local find.

In preparing this paper the following herbaria have been examined: Purdue University, containing 22 Indiana species, many collected by Dr. C. R. Barnes, in Jefferson county; the herbarium of G. C. Hubbard, with 24 species, collected mostly in Southern Indiana; that of Wabash College, with 25 species, largely collected by Dr. J. M. Coulter; that of DePauw University, with 29 species, collected by D. T. McDougal in Putnam and by W. S. Blatchley in Monroe and Vigo; and that of the writer with 35 Indiana species collected in various parts of the state, mostly during the present season.

Valuable notes have also been sent by Rev. E. J. Hill, Dr. J. Schneck, W. P. Shannon, W. S. Blatchley and Professor A. H. Young. It is hoped that the work of a second season will give more definite and fairly complete information regarding the distribution of critical species.

THE ADVENTITIOUS PLANTS OF FAYETTE COUNTY, IND. By ROBERT HESLER.

During the period from 1881 to 1890 the writer kept a close watch upon the flowering plants of Fayette county, noticing particularly the arrival of plants commonly regarded as weeds. During those ten years there were at least thirty-five new arrivals; of these twenty appeared along the railroads, ten along roadsides and waste places, four in meadows, one in a cultivated field. Of the thirty-five, seven again disappeared after a year or two, eighteen merely held their own or spread only to a limited extent, while ten have swept across the county and may now (*i. e.*, 1890) be found almost everywhere.

A brief note on the main features of the county may aid in better understanding the changes in the flora. Fayette county is almost due east of the capital and is the second county from the Ohio state line. The county was formerly densely wooded. The surface, excepting the level northwest portion, is rolling and in places even hilly, especially along the southern boundary. The whole surface is covered by drift. The county is divided from north to south by a broad valley through which the White Water

river flows. The valley has a black, gravelly soil of great fertility. The White Water railroad traverses the county from north to south; the Lake Erie & Western goes north from Connersville. The Cincinnati, Hamilton & Indianapolis crosses the county from east to west, and crosses the W. W. R. R. at Connersville, and at a different level. I mention this fact because it has some bearing on the distribution of weeds.

In the following notes the plants are given in the order of arrival by years. The first two years are grouped together, as my notes do not allow me to differentiate. At that time I did not get over the county so much as in after years, and some of the plants may have appeared a year or two before this date. After the year 1882 I traversed the ground so frequently that I am sure the dates given for the arrival of new species are correct. The nomenclature is that of the last revised edition of Gray.

The following nine plants were seen during the years 1881 and 1882, that is, when I first began botanizing systematically.

*Echinosperrum Lappula*, seen along the W. W. R. R. near Connersville. The patch has increased only slightly, not inclined to spread much.

*Arenaria serpyllifolia*, a small plant first seen along the W. W. R. R. below town. Now very common in sandy or gravelly soil. Not given in Coulter's catalogue of the plants of Indiana.

*Potentilla Norvegica*, occasionally seen in meadows, and is now rather common.

*Medicago lupulina*, seen along the C., H. & I. west of town, is now frequently seen along the railroads and roadsides.

*Dysodia chrysanthemoides*, seen in the locality near the last, and is now common throughout the county.

*Geranium Carolinianum*, along the W. W. R. R. below town, and now along the whole line.

*Verbena officinalis*, along roadsides west of town, now frequently seen in the valley.

*Montelia tuberculata* (var. *subnuda*), first seen along the C., H. & I. R. R. east of town, now common along that road and frequent in the valley.

*Croton monanthogynus* shows the rapid spread of a new arrival. In 1882 a small patch was first seen a few miles below town in an isolated meadow near a creek. The next year it appeared along the W. W. R. R. Two years later it could be found throughout the White Water valley, or wherever there was dry gravelly or sandy soil.

Beginning with the year 1883 I can give a definite date for each species.

As I have already stated, I went over the ground so frequently that I am sure the plants did not exist before the date given. The only exceptions to this statement are in the case of the *Balm* and *Poison Hemlock*, these grew in isolated places not frequently visited.

1883.

*Cassia Chamaecrista*, appeared along the W. W. R. R. south of town, now frequent along all the railroads.

*Chrysanthemum leucanthumum*, the Ox-eye daisy, in a meadow near town, now frequently seen.

1884.

*Lactuca scarioli*, a rank weed, W. W. R. R. in city, spread rapidly along this railroad and is now very common along it.

*Nicandra physaloides*, appeared in a corn field near the railroad south of town, disappeared, again reappeared in 1888 and again disappeared.

*Eragrostis major* (and perhaps also *E. minor*), the only addition in the grasses appeared along the W. W. R. R., above town.

1885.

*Gaura biennis* in a waste place near town, now occasionally seen along the W. W. R. R.

*Verbena bracteosa*, along roadsides east and west of town, mainly on uplands, seldom seen in the valley.

*Lithospermum arvense*, the so-called Wheat-thief, along W. W. R. R., south. All plants seen were destroyed, but it reappeared the next year. Now common along the railroads, but as yet rare in fields or meadows.

*Solanum Carolinense*, seen along the C., H. & I. R. R., east, and destroyed; none seen for two years. It is now frequently seen.

1886.

*Melilotus alba*, the sweet clover, appeared along the C., H. & I. R. R., west of town. It is now a very common and rank weed.

*Solidago lanceolata*, along roadsides just west of town; not inclined to spread.

*Rudbeckia laciniata*, a tall cone-flower, appeared in the valley, and is apparently just holding its own; is not spreading.

*Melissa officinalis*, the Balm, is no doubt an escape from a garden. Not spreading.

*Verbena stricta*, first seen along the W. W. R. R., south of town; now frequent along this road and occasionally seen along the other railroads.

1887.

This year was the banner year for new arrivals, as nine new species appeared.

*Conium maculatum*, a few individuals of this rank poisonous plant were seen near a dwelling in an isolated region. I do not know its ultimate fate. No other specimens were found.

*Saponaria vaccaria* appeared in considerable numbers west of town along the C., H. & I. R. R. This is an annual plant. It appeared for one season only.

*Enothera sinuata*, a few plants were found a few miles east on the C., H. & I. R. R. Three years later it had entirely disappeared.

*Gaura coccinea*, a far western species, appeared near the last, and after a few years died out.

*Rudbeckia speciosa*, a small patch of this showy cone-flower was found in a wet meadow away from all lines of travel. This patch is gradually increasing and when in full bloom presents a beautiful appearance. This plant is not reported in Coulter's Catalogue.

*Cnicus arvensis*, the Canada thistle, appeared at the C., H. & I. R. R. station. The attention of the railroad company was called to the presence of this pest and all specimens were thoroughly destroyed. It has not been seen since.

*Plantago lanceolata* had been frequently seen in the county below us, but not until 1887 did we find it in Fayette county. It is now a very common weed.

*Euphorbia dentata*, a few plants appeared for a season along the W. W. R. R., a mile or two below town. Has disappeared entirely.

*Hypericum perforatum*, a single plant was found along a roadside west of town; it was destroyed at once.

1888.

*Melilotus officinalis*, the yellow sweet clover, appeared along the C., H. & I. R. R., in town.

1889.

*Plantago Virginica* was found quite abundantly along the Ft. Wayne R.R., and the next year was quite common along all the railroads in the valley.

1890.

Very little botanizing was done this year and only one new species was found. Two or three specimens of the false flax, *Camelina sativa*, appeared along the W. W. R. R. below town.

## NEW PLANTS NOW COMMON.

Out of the thirty-five new arrivals, the following nine have taken the county by storm—that is, they are now very common:

Arenaria serpyllifolia.	Lactuca scariola.
Croton monanthogynus.	Melilotus alba.
Dysodia chrysanthemoides.	Plantago Virginica.
Chrysanthemum leucanthemum.	Plantago lanceolata.
Lithospermum arvense.	

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## SOME EVOLUTION AMONG CACTI. By JOHN M. COULTER.

[ABSTRACT.]

The nascent tubercles of *Eumanillaria*, *Coryphantha*, *Echinocactus*, *Ana-halonium* and *Lophophora*, show in their generic characters perfectly intergrading characters, which serve to clear up certain homologies and relationships.

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## PHYSICS AND CHEMISTRY.

## PERMANGANIC ACID. By THOS. C. VAN NUYS AND SHERMAN DAVIS.

It is the purpose of this investigation to work out, if possible, I. The exact conditions under which permanganic acid or its salt undergoes spontaneous decomposition. II. Whether it is effective as an oxidizing agent in the decomposition of organic matter.

I. For determining the exact properties of the acid or its salt, the following plan was adopted. Glass tubes, about 30 mm. and 30 cm. long were sealed at one end and carefully annealed. They were then filled with a strong  $H_2SO_4$  sol. of potass. permanganate and heated to  $100^\circ C$ . for 12 hrs. This treatment completely removed any organic matter adhering to them. The distilled water was purified by boiling a strong  $H_2SO_4$  sol. of potass. permanganate, with a condensing apparatus, for some time and then distilling the second time with  $KMnO_4$ . The  $NaOH$  used in making the standard alkali sol. was prepared from the pure metal and absolutely pure water. The tubes were then carefully rinsed with the C. P