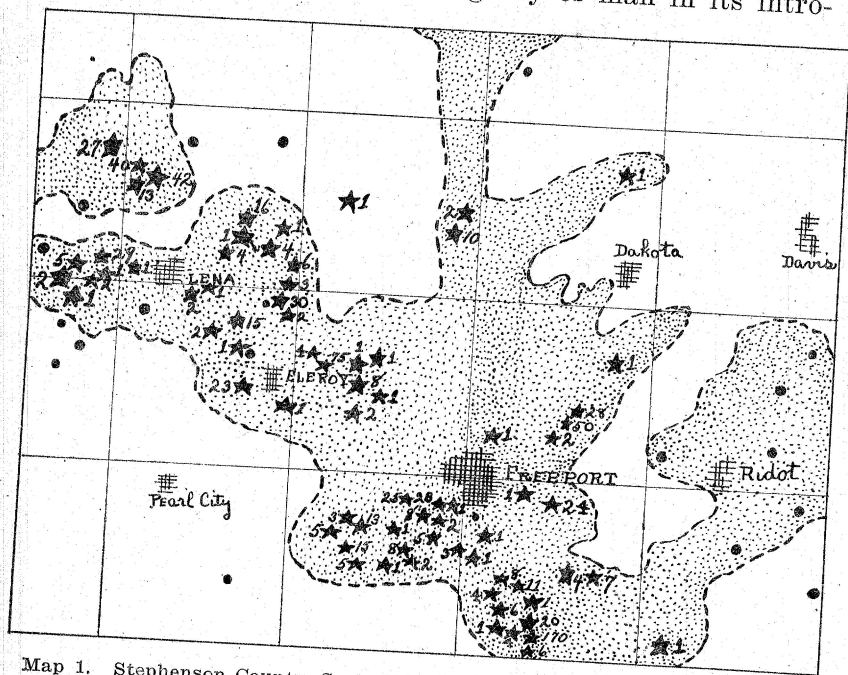


THE HABITAT OF NATURALIZED COMMON BARBERRY IN ILLINOIS

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An important problem in the prosecution of the country survey for common barberry in Illinois, as well as in twelve other states, has been to determine in what places one might expect to find barberry shrubs escaped from cultivation. That some index of locations favorable for the naturalization of the shrub would greatly expedite the survey can not be doubted.

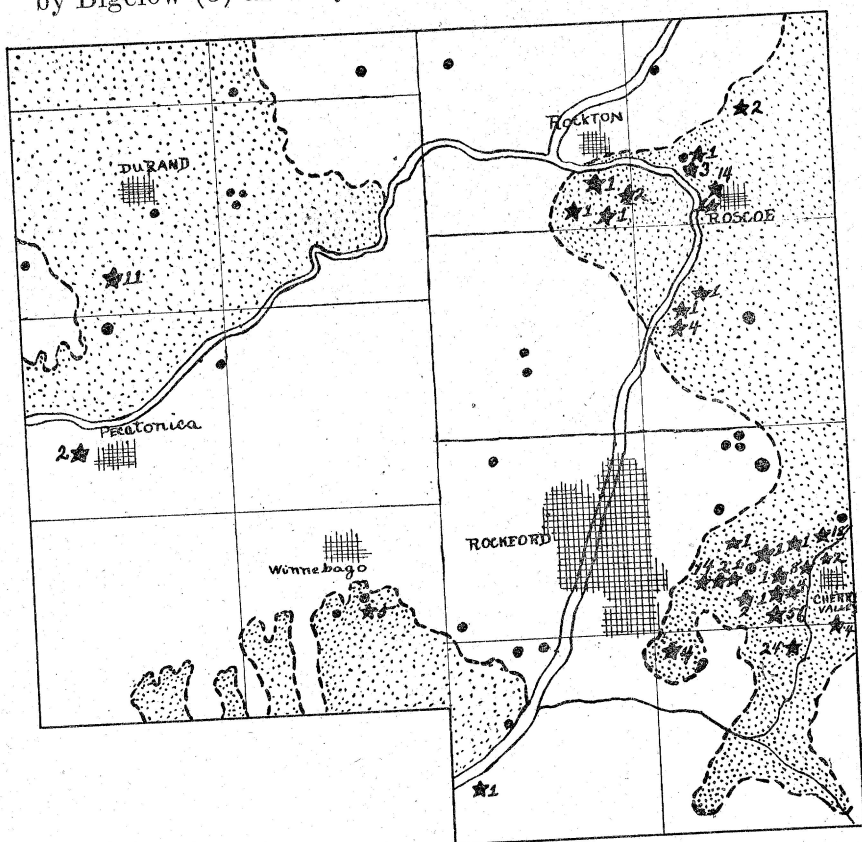
The presence of the common barberry (*Berberis vulgaris* Linn.) in the United States, it is generally admitted, is due to its introduction from Europe. DeCandolle (1) points to its absence from the islands west of America and east of Asia, which might be supposed to serve as distributional bridges between the two continents, as a geographical indication of the agency of man in its intro-



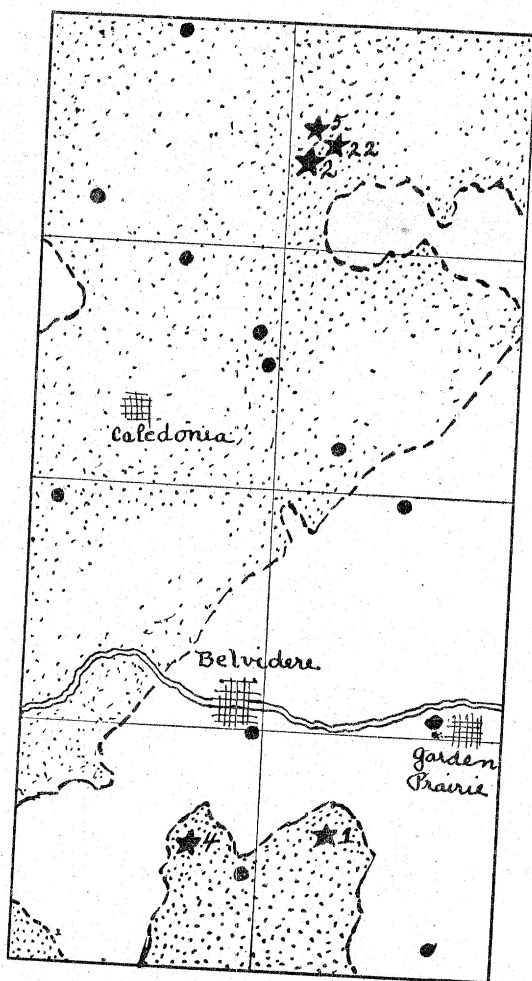
Map 1. Stephenson County. Scale $\frac{1}{4}$ " = 1 mile. * Location of escaped plantings. • Location of cultivated plantings. Figures indicate numbers of bushes.

duction to America. Following its introduction, it has spread both as an ornamental shrub and in its naturalized condition throughout a large area in the cold-temperate belt of our continent.

The first point where the shrub was introduced into America was probably along the coast of New England where Sir Charles Lyell (2) speaks of it as having been introduced, supposedly as an ornamental shrub. Sir Charles Lyell also attributes its spread toward the interior, in a naturalized state, to the agency of animals which eat the berries. In our botanical manuals, it is probably first mentioned as having become naturalized by Bigelow (3) as early as 1813 near Boston.



From its point of first introduction and naturalization, the shrub has spread westward across the continent, traversing in its role of decorative shrub, dye-producer, jelly-maker, and spreader of rust, the paths of migration in company with the hardy pioneers of our early history. In Illinois, its presence, both as old and large cultivated shrubs and hedges and in extensive naturalized plantings, still marks the pathway of the early settlers from east to west and indicates those places which our forefathers con-

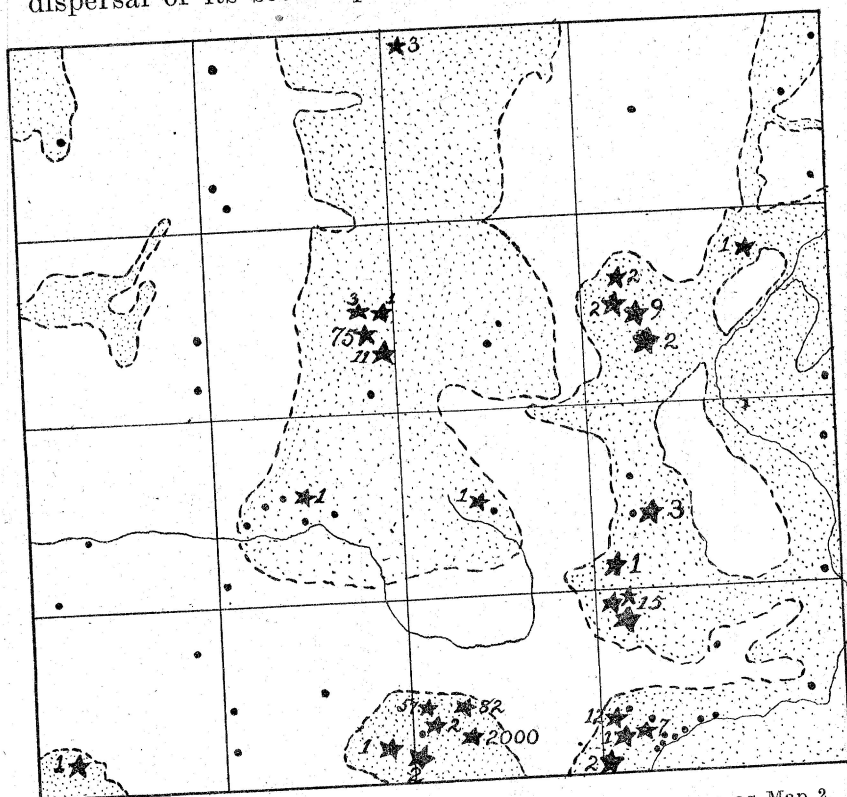


Map 3. Boone County. Scale $\frac{1}{4}$ " = 1 mile.
Markings same as Map 2.

sidered most promising for settlement and home building. Always in those places where it has been long established, it has escaped from cultivation and spread itself throughout the countryside; sometimes in many plantings consisting of large numbers of well developed shrubs and multitudes of seedlings; and sometimes only in occasional adventitious plantings having a few scrawny weakling shrubs.

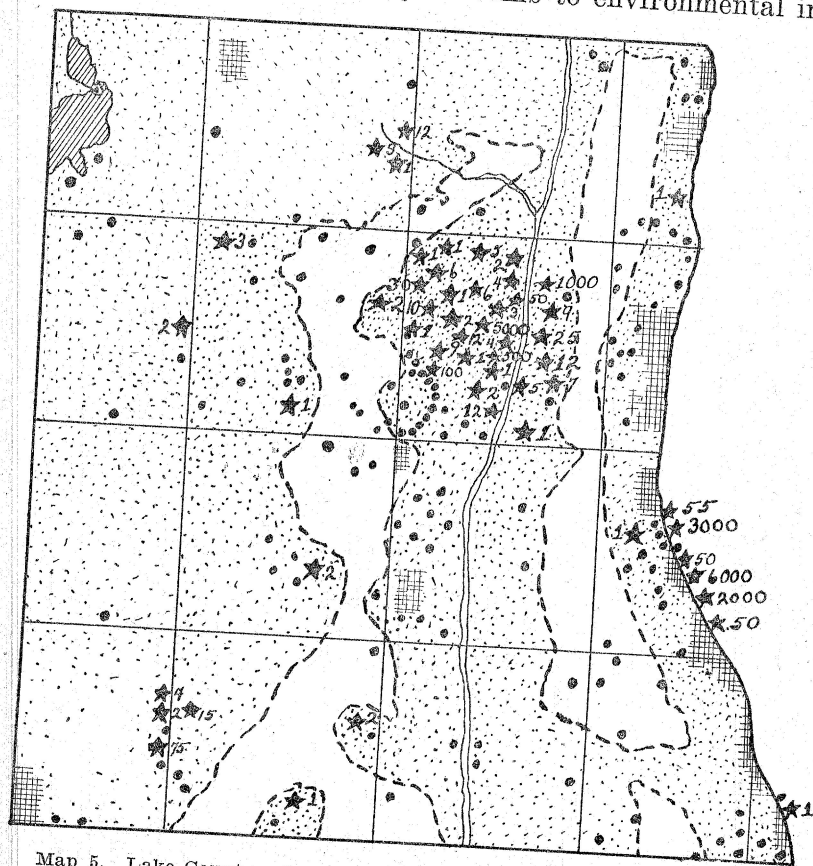
Such variation in numbers, both of escaped plantings and shrubs, together with a very apparent lack of uniformity regarding the chemical nature of the soils they inhabit, has led to a certain amount of speculation as to the ideal habitat for the barberry.

It is obvious that, since the barberry depends for the dispersal of its seeds upon the assistance of birds (4),



Map 4. McHenry County. Scale $\frac{1}{4}$ " = 1 mile. Markings same as Map 2.

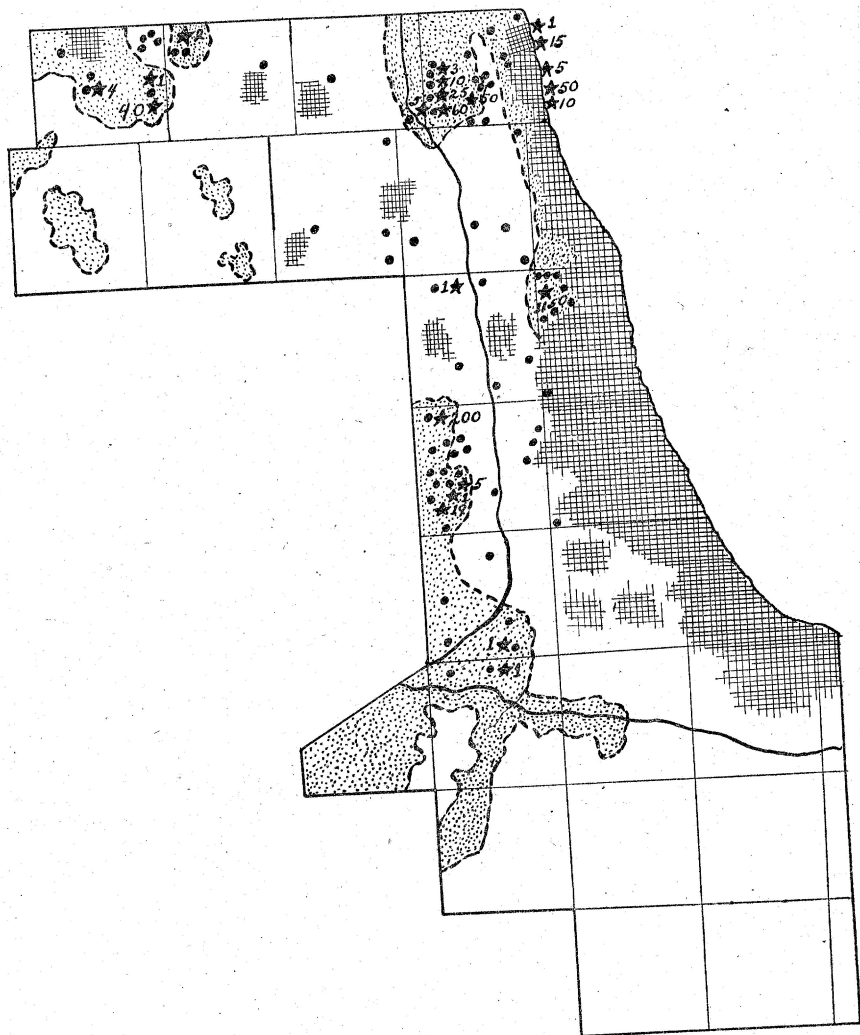
(5), (6) and other animals (7), (2), the location of escaped plantings must be determined, in some degree, by the presence of floral or topographic situations likely to be visited by the birds and animals after feeding. This fact is illustrated by the relation of naturalized and cultivated plantings as shown in maps 1-8. Relative distances are certain to be important. An area in Lake county drawn on map 9 (Township 45 North, Range 11 East of Third Principal Meridian) shows the profusion of naturalized plantings to be expected where favorable bird habitats abound in close proximity to cultivated shrubs. Whether or not the seeds so distributed shall spring up into tall-growing, vigorous shrubs or, having sprouted, shall eventually succumb to environmental in-



Map 5. Lake County. Scale $\frac{1}{4}$ " = 1 mile. Markings same as Map 2.

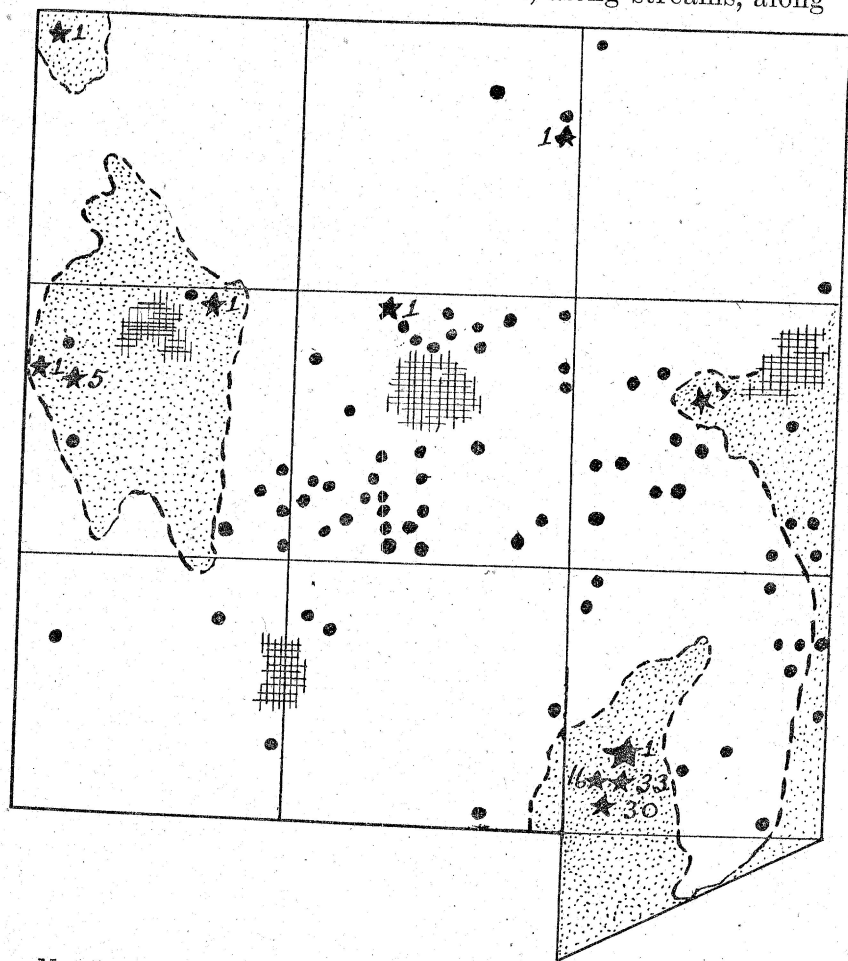
fluences will, on the other hand, be determined by factors of an origin and significance different from those controlling only the dissemination of the seeds.

In the first years of the barberry survey, it was supposed that the most favorable locality for the development of wild plantings was in regions characterized by calcareous soils. This opinion seemed supported, in our



Map 6. Cook County. Scale $2/16'' = 1$ mile. Markings same as Map 2.

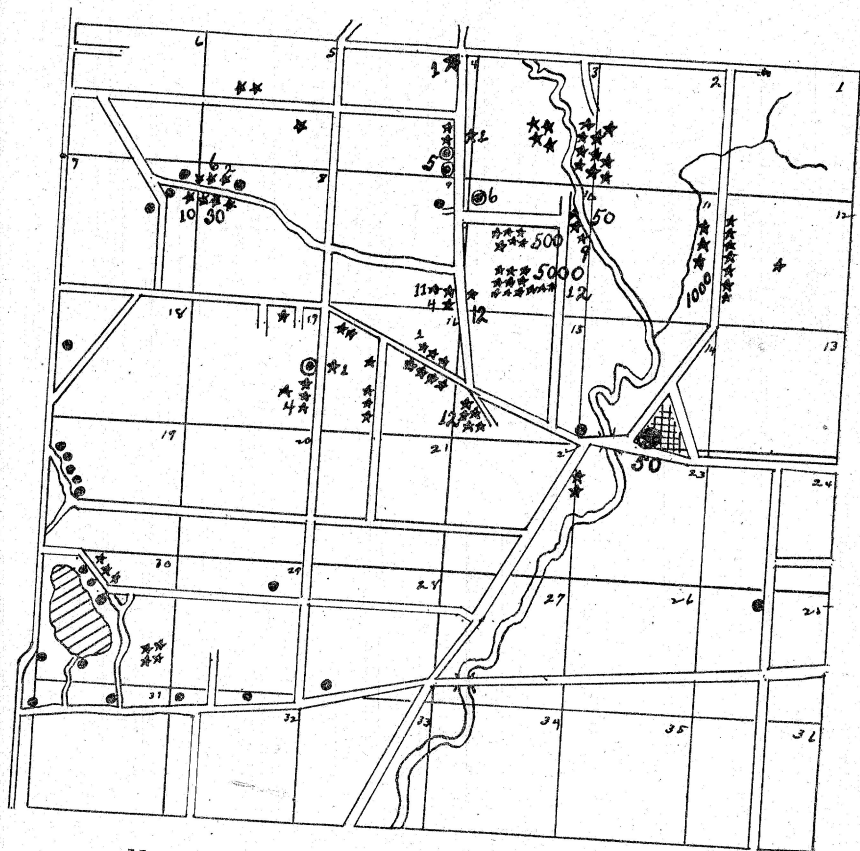
limited experience, by the frequent reports of plantings occurring in or near limestone quarries. As time has progressed, reports of barberries comfortably naturalized in many other situations, such as, for example, among the dunes of Michigan and the shales in Illinois, have indicated that some other explanation for habitat must be sought. The wide range of habitat is indicated by Kern (8) for Pennsylvania, as in "residual soils, whether formed from sandstone or shale, limestone, igneous and metamorphic rocks. Glacial soil seems to be equally favorable. * * * In thickets, along streams, along



Map 7. DuPage County. Scale $\frac{1}{4}$ " = 1 mile. Markings same as Map 2.

roadsides, in open pastures or half-wooded hillsides, this plant seems to be at home." There would be no difficulty in enumerating locations in Illinois which would duplicate each item of Kern's heterogeneous list. Yet, in Illinois, there seems to be a consistent relation which may be pointed out as existing between naturalized plantings and the locations they occupy.

This relation is not to be seen in any consideration, individually, of our many escaped plantings; but it is apparent in a complete grouping of them all in relation to the dominant features of the habitat in which they are found to occur.



Map 9. Territory surrounding Gurnee, Lake County.

As a preliminary basis and to provide as substantiating evidence the fact that reasonably large numbers of observations are available, the following tables are included.

TABLE 1.

Total barberry plantings found and removed in eight counties:

Counties Alphabetically	Cities and Towns	Number of Properties in Country		Both, on which bushes were	
		Having Escapes	Total	Found	Removed
Boone	48	1	20	68	68
Cook	1371	27	107	1478	1401
DuPage	336	12	82	418	345
Kane	490	7	33	523	418
Lake	2298	65	176	2474	2360
McHenry	209	26	74	283	264
Stephenson	119	93	110	229	229
Winnebago	631	64	75	706	706
Total	5502	295	677	6179	5791

TABLE 2.

Total barberry plantings found and removed in entire state:

Survey	Cities and Towns	Number of Properties in Country		Both, on which bushes were	
		Having Escapes	Total	Found	Removed
Original	7724	346	794	8518	5523
Resurvey .....	....	....	....	....	....
Removals .....	....	....	....	....	2250
Total	7724	346	794	8518	7773

TABLE 3.

Total barberry shrubs found and removed in eight counties:

Counties Alphabetically	Cities and Towns	Number of Bushes in Country		Both cities and country		Sprouts on Re-
		Escaped	Total	Found	Re- moved	survey Found
Boone	2426	1	119	2545	2545	4
Cook	10935	1610	5058	15993	14200	113
DuPage	7232	84	3305	10537	7058	201
Kane	9053	241	1119	10172	9314	222
Lake	10784	18914	20706	31490	28379	462
McHenry	3707	2480	3313	7020	4098	250
Stephenson	1426	860	1320	2746	2746	705
Winnebago	5825	281	686	6511	6511	320
Total	51388	24471	35626	87014	74851	2277

TABLE 4.

Total barberry shrubs found and removed in entire state:

Survey	Number of Bushes in						Sprouts on Re- survey
	Cities and Towns	Escaped	Total	Both cities and country Found	Re- moved	Found	
Original	92500	25635	42289	134789	81841	.....	.....
Resurvey	.....	.....	.....	.....	.....	.....	.....
Removals	.....	.....	.....	.....	33056	.....	2336
Total	92500	25635	42289	134789	114897	2336	.....

As previously mentioned, the first supposition that the common barberry might find especially favorable conditions for wild growth in calcareous situations has not been substantiated by later experience. This is a condition which should probably be expected since Schimper (9. p. 100) remarks especially concerning the variation of the flora found on calcareous soils, in that in places plants may be found to be calciphilous, elsewhere silicifilous, and elsewhere apparently indifferent. He also notes (9. p. 100) that one species may be calciphilous in one area, calciphobous in another, and indifferent in yet a third. It may be doubted whether, in such cases, chemical characters of the soil are of so much importance as are associational or edaphic factors.

In the eight counties of Illinois surveyed thus far for barberry, there is apparent a correlation between the location of escaped shrubs and the area once occupied by our primeval forests (10). Maps 1-8, in which escaped plantings are indicated, illustrate this fact and it may also be seen that in a majority of cases the plantings are located near the edge of the forested areas. It may be thought that this fact is due to the majority of settlements being located first upon the edges of timbered areas; but in locations toward the interior of timber areas where naturalized shrubs have been found, it is constantly observed that they are on the edges of the forest and present only when clearings are relatively large. Only two plantings, each of a single shrub, are at present known to occur in dense forest. Neither of these is far removed from the forest's edge, and each apparently is surrounded by secondary growth whose origin is more recent than that of the barberry.

This is a condition which, in its total aspect, approximates rather closely the habitat of the barberry in the Carpathian region, where, according to Pax (11), "am Waldrande und an lichter Stellen des Hochwaldes erscheint ein charakteristisches Buschwerk aus *Berberis vulgaris*" and other shrubs. A similar statement is made by Pax at a later point (11. p. 257). This statement implies an association with other shrubs in a similar habitat, which is readily substantiated in Illinois through its association with the gooseberry (*Ribes grossularia* Linn.) and the buckthorn (*Rhamnus cathartica* Linn. and *R. lanceolatus* Pursh.) and the hawthorns (*Crataegus* spp.).

That the presence of barberry in such shrub associations should be expected is evident from the fact that, in the first place, forest soils offer opportunity for growth in that they have been thoroughly worked over by their worm inhabitants and in that the resulting rich aeration of mould leads to the formation of highly oxidized neutral substances so that acids may form as low a proportion as one-sixteenth of the organic substance.

The presence of primeval forest on any area must preclude the possibility of shrub growths because of light relations but, following the thinning of the forest and its eventual destruction, the alteration of the light relations, and of the soil through drying out and through the dying off of its worm inhabitants, gives rise to a dry heath soil where shrub growth may take place under favorable auspices. In fact, such an environment should prove almost ideal because (9. p. 542) the edaphic conditions of the heath in cold-temperate belts give to shrub formations their most widely spread types.

It may be argued in contradiction to the foregoing that the locations indicated on our maps present a suggestion of the influence of lakes and rivers to the presence of escaped barberries, but it should be remembered that there is to be expected an increasing luxuriance of forest formations near lakes and rivers where moisture is increased by infiltration. It is noteworthy also that, in the occurrence of escaped barberries near streams,

the shrubs are to be found almost without exception on the higher and dryer banks.

Exceptions to the suggestion contained in this paper undoubtedly occur. In three cases in Illinois, small plantings of escaped shrubs occur where it is not known that primeval forest has existed. In one instance, the shrubs grew beneath cultivated cedars of considerable age, and in the remaining two instances where fences had served as resting places for birds. These shrubs, however, were not of any great age and may be supposed to be the only remaining plants from hundreds of seeds similarly dropped throughout many square miles of land never forested; hence truly adventitious in that habitat.

RESUME

The habitat of naturalized barberry shrubs in the cold-temperate belt of the United States has been suggested as influenced by the presence or absence of calcareous soils. It is shown in the present paper that in Illinois an apparent relation between heath and "timber-soils" and barberry occurrence exists so generally as to indicate that this shrub, in becoming naturalized, seeks a characteristic shrub habitat. A practical application of this fact lies in paying particular attention to those districts characterized as having "timber soils", in the search for naturalized plantings of the common barberry.

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EXPLANATION OF FIGURES.

On Maps 1 to 8, townships are shown, and on Map 9 sections are shown.

Stars indicate the location of naturalized plantings, and figures accompanying them show the number of shrubs growing there.

Large dots indicate the location of cultivated plantings.

Stippled areas inclosed by dotted lines, indicate upland timber soil.

Map 1 Stephenson county

2 Winnebago county,

3 Boone county

4 McHenry county

5 Lake county

6 Cook county

7 DuPage county

8 Kane county

9 Territory surrounding Gurnee, in Lake county, showing the spread of the common barberry from an old hedge of about 50 shrubs in the town of Gurnee.