On the distinctive characters of the roots of aconitum napellus (monkshood) and cochlearia armoracia (horse-radish) / by Robert Bentley.

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ON THE DISTINCTIVE CHARACTERS OF THE ROOTS OF ACONITUM NAPELLUS (MONKSHOOD) AND COCHLEARIA ARMORACIA (HORSE-RADISH).

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SEVERAL fatal cases of poisoning having occurred by the accidental substitution of monkshood, or, as it is commonly called, aconite root. for horse-radish, I thought it might not be uninteresting to the members of the Pharmaceutical Society to have their attention directed to the characters by which these roots might be readily distinguished from each other.

Aconitum Napellus (Monkshood).—The root of this plant is a biennial. It is formed on the side of the root of the previous year during the summer and autumn, and the old root then gradually decays. About the months of October, November, December, and January, when the leaves are absent, it possesses the greatest activity, and hence the above months are the best time to collect it when required for medicinal use, and also that period in which its poisonous effects are the most intense. The time, therefore, when the root is most poisonous is that when it is alone liable to be substituted for horse-radish for when the leaves appear the two roots are not likely to be confounded. In length the root of monkshood averages about five inches, but sometimes it is as much as eight, or even ten inches if grown in a very luxuriant soil. In form it resembles the cultivated carrot, or more nearly the common parsnip, being broad at its upper extremity and tapering gradually downward to a small thread-like point (see figs. 1 and 2); the upper extremity, on an average, being about the thickness of the middle finger, but frequently an inch or more in diameter. Sometimes the main root divides into two or three divisions, each of which resembles the other (such as is represented in fig. 7 of *Aconitum Japonicum*). It passes perpendicularly into the earth, giving off from its sides numerous cylindrical fibres, about the thickness of a common knitting needle. In colour, externally, the main root and its fibres are coffee-coloured, or dark brown, or some shade of brown. Internally, it is white. It has no particular odour, being merely earthy. Its taste is at first bitter, but in a few minutes a very peculiar feeling of numbness and tingling is perceived in the lips, cheeks, and tongue.

Cochlearia Armoracia (Horse-radish).—The root of this plant is a perennial. It is commonly a foot or more in length, giving off from its sides a number of irregular branches of variable sizes (see fig. 3), and terminating frequently at its upper extremity in two or more divisions, from which the leaves arise (see fig. 4). In diameter above it varies from about half an inch to two inches or more; as commonly used, it is about the thickness of the thumb or middle finger. In form it is enlarged above at the crown or point where the leaves are given off; it then slightly tapers for a short distance, and becomes ultimately more or less cylindrical, and instead of tapering gradually to a point, as the root of monkshood, it frequently maintains nearly the same thickness to its lower extremity, and then commonly divides into two or more branches. In other cases, however, it does taper somewhat from its upper to its lower extremity, but by no means, in any instance, so evidently as the root of monkshood. In colour, externally, it is white with a tinge of yellow, and whitish internally. Its odour, when scraped or bruised, is exceedingly penetrating and acrid, exciting frequently sneezing and secretion of tears. In taste it is very pungent, especially in autumn and spring, accompanied by a bitter or sweet flavour, according to circumstances; as, for instance, the season at which it is collected, the manner in which it has been cultivated, and the soil in which it is grown.

The more important distinctive characters between the two roots may be thus tabulated and contrasted:—

MONKSHOOD.	HORSE-RADISH.
Conical in form, and tapering perceptibly to a point.	Slightly conical at the crown, then cylindrical, or nearly so, and almost of the same thickness for many inches.
Coffee-coloured, or more or less brownish, externally.	White, or with a yellow tinge.
Odour merely earthy.	Odour especially developed upon scraping, when it is very pungent and irritating.
Taste at first bitter, but afterwards producing a disagreeable tingling and numbness.	Bitter or sweet according to circumstances, and very pungent.

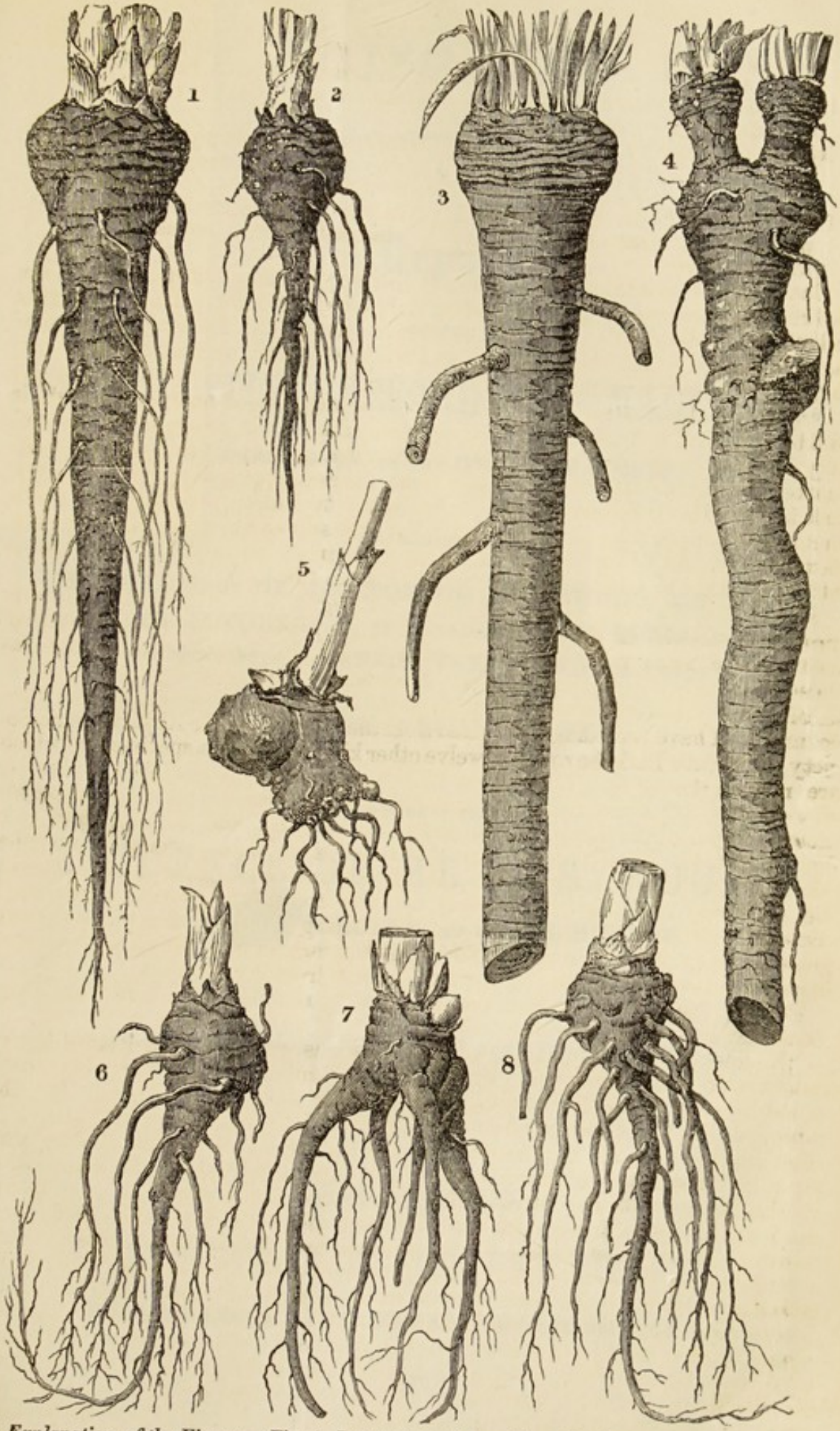
The roots of monkshood and horse-radish may be also distinguished by the different appearances they present when scraped with a knife. Thus the former will then be observed to be of a succulent character, and the scraped portions soon to acquire a pinkish or reddish hue, whilst the latter scrapes firm and dry, and does not alter in colour.

From the above description of the roots of monkshood and horse-radish, it will be seen that instead of resembling each other, as is commonly supposed, they have scarcely any appearance in common, presenting evident and well-marked distinctive characters in their form, general appearance, colour, odour, and taste. The only resemblance between the two roots, and this but a slight one, is in the appearance of their crowns, but even supposing it possible to mistake them so far, the other characters of distinction are so well marked, that no difficulty ought to arise in distinguishing between them.

Such being the case with these roots, I thought it possible that some other species or varieties of the genus Aconitum might possibly resemble horse-radish root; and as many varieties are commonly cultivated in our gardens, and as these frequently possess similar poisonous properties to monkshood, although more feeble, their substitution would equally account for the fatal accidents that have occurred. I have accordingly obtained from the Gardens of the Royal Botanic Society in Regent's Park the roots of twelve other kinds of aconite, specimens of which are now on the table. They are as follows:—*Aconitum Japonicum*, *A. Sinense*, *A. cæruleum*, *A. Akermannii*, *A. paniculatum*, *A. pyrenaicum*, *A. ochroleucum*, *A. neomontanum*, *A. uncinatum*, *A. Cammarum*, *A. Pallasii*, and *A. Lycostonum* (see figs. 5, 6, 7, 8). It will be seen that the roots of all these species or varieties which are commonly cultivated in our gardens, resemble more or less that of the *Aconitum Napellus* (monkshood) in their colour and general appearance, the only difference between them and it consisting in the fact that some of them present a roundish or irregular knobbed root instead of a conical one; so that it would be even more easy to distinguish them from horse-radish.

Besides the above species, the roots of a number of others have been examined by me with the same result.

The distinctive characters between the various species of aconite and horse-radish roots being therefore so evident, it seems most extraordinary that a cook could by any possibility confound them; for in preparing them for the table, one could not but observe the difference in colour, form, and odour. I should think it quite as reasonable if any one were sent into the poultry-yard for a fowl that they should bring a duck, or even a turkey, for the substitution in this case would not be anything more remarkable than that one should confound monkshood root with that of horse-radish. There is this difference, however, in the two cases. Thus, persons are taught by observation and education the distinctive characters of our domesticated animals and birds; whilst in regard to substances derived from, or parts of plants, they are totally ignorant, although ignorance in the latter case is attended with far more injurious consequences than in the former, leading as it does frequently, as we have seen, to distressing and fatal accidents. Let us hope, therefore, that the time is not far distant when such knowledge will be considered as essential, and will accordingly form a branch of the education of the young, whatever be their rank or station. Till so desirable an end can be arrived at, we must do our best by the aid of Museums, such as those of the Pharmaceutical Society, of Kew, and of the Royal Botanic Society of London, to give as much information as we are able by the exhibition of vegetable substances and parts of plants, in common use in the arts, manufactures, and domestic economy.



Explanation of the Figures.—Fig. 1. Large root of Aconitum Napellus. Fig. 2. Small root of ditto. Fig. 3. Root of Horse-radish, as commonly sold. Fig. 4. Irregularly shaped root of Horse-radish. Figs. 5 and 6. Roots of Aconitum Paniculatum. Fig. 7. Root of Aconitum Japonicum. Fig. 8. Root of Aconitum Cammarum. The roots of the different species of Aconite are drawn about half the natural size; those of Horse-radish about one-third.