

SANTOLINA CHAMAECYPARISSUS L., AN ADULTERANT OF  
MATRICARIA CHAMOMILLA L.

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*Matricaria chamomilla* L., commonly known as German Chamomile, is a crude drug product which is normally imported in considerable quantities. In the ante-bellum days instances of sophistication of this product were comparatively rare. During the recent war, however, the usual source of supply (Germany) having been shut off, the product has been subjected to considerable adulteration. Instances of adulteration with the flowers of dog fennel, *Anthemis cotula* L.,<sup>1</sup> and wild Roman chamomile, *Anthemis nobilis* L., have previously been observed in this laboratory.<sup>2</sup> Both of these adulterants have been described in some detail in the literature, the latter especially being discussed recently in considerable detail by Ballard.<sup>3</sup>

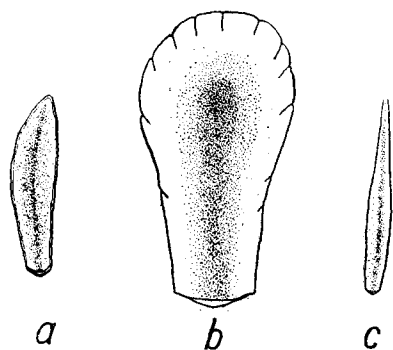


Fig. 1.—Chaffy scales of the receptacles of (a) *Santolina chamaecyparissus*, (b) *Anthemis nobilis*, and (c) *Anthemis cotula*,  $\times 5$ .

We have recently observed a new adulterant, not hitherto reported in the literature of drug adulteration, namely, *Santolina chamaecyparissus* L. A recent shipment invoiced as "Chamomile flowers," labeled in Spanish "La Manzanilla Aroma," consisted entirely of the flower heads of this species.

The Spanish name for chamomile is "Manzanilla." Under that title the flowers of the following species are recognized in the present Spanish Pharmacopoeia:<sup>4</sup> "*Anthemis nobilis* L. (Manzanilla Romana), *Matricaria chamomilla* L. (Manzanilla ordinaria), y *Cotula aurea* L. (Manzanilla fina)." Whether or not the name "La Manzanilla Aroma" was intended to convey the impression that the product was "La Manzanilla Romana" is a matter of conjecture, but since it was invoiced as "Chamomile flowers" and since *Matricaria chamomilla* is the only chamomile official, it must, of course, be considered as an adulterant of that product.

The genus *Santolina* of the family *Compositae* comprises only some six or eight species, of which *Santolina chamaecyparissus* is one of the more important. It is an erect branching bristly plant about one or two feet high, which is quite widespread in southern Europe, especially in Spain, where the present shipment originated. It is said to be the *Abrotanum foemina* of the ancients, their *Abrotanum mas* being our better known southernwood, *Artemisia abrotanum* L. More modern common names are garden cypress, ground cypress, and lavender cotton.<sup>5</sup>

<sup>1</sup> *Service and Regulatory Announcements*, Chemistry 22, 1918, item 257.

<sup>2</sup> Alsberg, Viehoever and Ewing, "Some Effects of the War upon Crude Drug Importations," *J. A. Ph. A.*, 6, 459-471, 1919.

<sup>3</sup> Ballard, "Wild Anthemis—A Possible Matricaria Adulterant," *J. A. Ph. A.*, 9, 952, 1918.

<sup>4</sup> *Farmacopoea Espanola*, VII, 411, 1905.

<sup>5</sup> Van Wijk, *Dictionary of Plant Names*, I, 1207, 1911.

The flowers of *Santolina chamaecyparissus* have several characteristics which differentiate them from *Matricaria*. They, in common with certain *Anthemis* species which have been used as adulterants of *Matricaria*, have a solid<sup>6</sup> chaffy receptacle, whereas that of *Matricaria* is hollow and without scales. The chaffy scales (Fig. 1-a) of the receptacle of *Santolina chamaecyparissus* resemble somewhat the well known glume of wheat and are different from the broad membranous scales of *Anthemis nobilis* (Fig. 1-b) and the bristly acuminate scales of *Anthemis cotula* (Fig. 1-c). By far the most notable characteristics of *Santolina* flowerheads, however, are the total absence of ray florets and the recurving of the disk florets (Fig. 2-a, b, d) which gives an appearance so different and so striking that even a novice should be able to distinguish them at first glance.

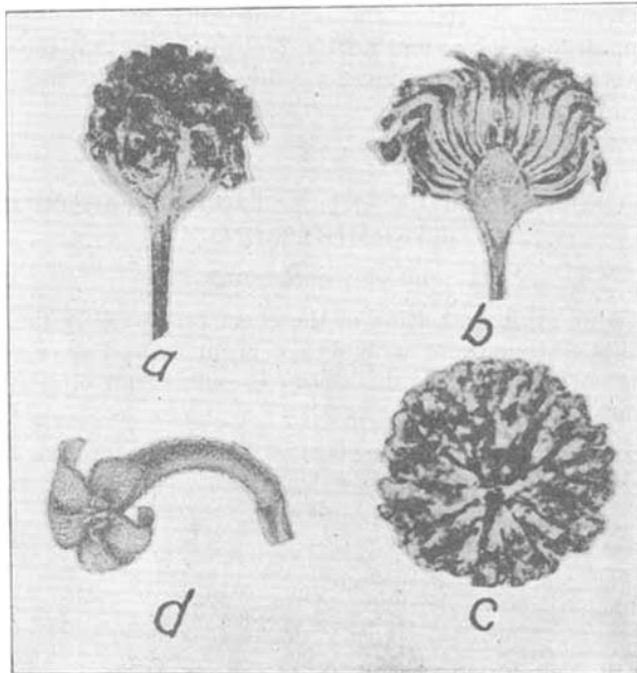


Fig. 2.—Flower head of *Santolina chamaecyparissus* L.

- a. Side view,  $\times 4$ .
- b. Cross section showing solid receptacle and recurved disk florets,  $\times 4$ .
- c. Top view,  $\times 4$ .
- d. Individual floret,  $\times 10$ . After Hoffman.

Although Rusby<sup>7</sup> states that "several species of *Santolina* are used similarly" [to *Matricaria*], we have not found the flowers of this or any other species specifically noted or described in the literature as an adulterant of *Matricaria*. Hager,<sup>8</sup> however, records the use of the leaves to adulterate rosemary leaves.

<sup>6</sup> Most authorities on botany and pharmacognosy agree that *Anthemis nobilis* has a solid receptacle, although Kraemer (Scientific and Applied Pharmacognosy, 1915, 774) states it is "occasionally hollow."

<sup>7</sup> Nat. Stand. Dispensatory, 1916, 1008.

<sup>8</sup> Hager, *Handbuch der Pharmaceutischen Praxis*, II, 821, 1907.

With regard to the chemistry of the flowers themselves, little information is available in the literature. Maben<sup>9</sup> reports a partial but non-illuminating proximate analysis of the "herb," which he speaks well of as an anthelmintic. His statement that the odor is due to a volatile oil is no doubt correct, although he reports no analysis to determine this. His conclusion that "the bitter principle which is probably of an alkaloidal nature, \* \* \* seems to be the active portion of the drug \* \* \*," is also without foundation so far as his recorded data show. The flowers of our sample were more aromatic than those of either German or Roman chamomile; the aroma, however, was somewhat camphoraceous and lacked the sweetness and suggestion of amyl acetate<sup>10</sup> which is especially pronounced in the flowers of Roman chamomile. The taste was strongly camphoraceous and was less bitter than that of Roman chamomile; in the latter respect it more nearly resembled the German. Whatever the real medicinal qualities of the flowers may be, their appearance, flavor and taste make it unlikely that the product will be accepted by the trade as a substitute for either German or Roman chamomile.

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## POTENTIAL ACIDITY OF MILK AND A STANDARD METHOD FOR ITS DETERMINATION.

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Recently, during an investigation of the effect produced by the addition of the various alkalis to cows' milk, as practiced in infant feeding, a very peculiar phenomenon was noticed; namely, the acidity of milk is not proportionately reduced by the addition of water.

CHART A.—QUANTITY OF  $\frac{N}{10}$  NaOH V.S. REQUIRED TO NEUTRALIZE FIFTEEN MILS OF MILK AT DIFFERENT DILUTIONS.

Percent milk.	Mils $\frac{N}{10}$ NaOH.				Blank.	Average.	Acidity.
	1.	2.	3.	4.			
100	2.64	2.62	2.65	2.63	0.03	2.605	17.36
75	2.50	2.47	2.49	2.49	0.03	2.460	16.40
50	2.25 <sup>2</sup>	2.31	2.33	2.34	0.03	2.300	15.33
33.3	2.12 <sup>2</sup>	2.18	2.21	2.24	0.04	2.170	14.46
25	2.06 <sup>2</sup>	2.14	2.14	2.14	0.04	2.100	14.00
20	1.97 <sup>2</sup>	2.07	2.02	2.06	0.05	2.000	13.33
10	1.91 <sup>2</sup>	1.96	1.95	1.97	0.12	1.840	12.26
5 <sup>1</sup>	0.85	0.85	0.89	0.88	0.12	0.750	10.00

<sup>1</sup> Half Quantity.

<sup>2</sup> Not an Average.

In one case, fifteen mils of milk required 2.60 mils of  $\frac{N}{10}$  NaOH for neutralization, whereas, fifteen mils of milk and fifteen mils of water only required

<sup>9</sup> Maben, "Note of Santolina chamaecyparissus," *Pharm. J.*, 3, 16, 301, 1885.

<sup>10</sup> The suggestion of amyl acetate, which has also been noted by Ballard (Loc. cit.) is probably not due to this substance, which has not been reported in the literature of Roman chamomile, but may probably be attributed to combinations of esters of angelic acid which are said to occur in the oil of *Anthemis nobilis* combined with butyl-, isoamyl-, isohexyl-alcohol, and anthemol. (Blaise, E. E., *Bull. soc. chim.*, 29, 327, 1903, and Semmler, F. W., *Die Atherischen Öle*, I, 830-31, 1905.)