Vegetable ivory – the Beja Botanical Museum photo collection

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Notes on Ethnobotany

Abstract
Vegetable ivory is a raw material used to make small objects, such as buttons, adorns for personal use or home decorations. It comes mainly from the seed endosperm of species belonging to the genus *Phytelephas* Ruiz & Pav.. The collection of Beja Botanical Museum includes a set of historical photos that show all the stages of vegetable ivory processing from seed to buttons, allowing us to have a more complete understanding of the raw materials and technologies used by this industry in the early 1930's.

Results and Discussion
Vegetable ivory is the name given to a plant raw material whose physical properties – color and touch –, are like those of the ivory obtained from the elephant's tusks. Animal ivory is made of dentin, a calcified tissue of teeth not related with plant ivory, which is made up of sugars, mostly mannans. These are polymers of mannose, a molecule whose etymology evokes the biblical manna, a substance of undetermined origin that allowed the Hebrews to survive in the desert of Sinai and that is mentioned several times in the Bible.

In the Middle Age, a secretion from the manna ash (*Fraxinus ornus* L.) began to be traded as manna and it was from this secretion that the alcohol 'mannitol' was first isolated, in 1806, by Joseph Louis Proust, whence its name (Kremers *et al.* 1986). In 1860, Eugen Freiherr von Gorup-Besanez proposed the name 'mannitose' for a sugar isolated from the secretion of the manna ash and, in 1888, Emil Fischer and Josef Hirschberger shortened it to 'mannose' (Fischer & Hirschberger 1888; Cohen & Basu 2017). The polymers of mannose found in the vegetable ivory are in the endosperm of the seed, which initially is soft and edible but, as it matures, becomes very hard. They are part of the reserves that the embryo will use during germination (Costa *et al*. 2008, Avenas 2013, Smith 2015).

There are several palm species from which vegetable ivory can be obtained, however, the most common ones are native to the tropical forests of South America and belong to the genus *Phytelephas* Ruiz & Pav., especially the species *Phytelephas macrocarpa* Ruiz & Pav. [Panama to Bolivia and NW Brazil] and *Phytelephas aequatorialis* Spruce. [Ecuador], which have a small to moderate size and a slow growth (Henderson *et al*. 1995, Dransfield *et al.* 2008). The etymology of the scientific name of *Phytelephas* derives from the Greek words *phytón* [= plant] and *eléphas* [= elephant]; literally, the '*elephant plant*'. The specific epithet *makrós* also derives from the Greek and means 'big, long', as well as *karpós*, the Greek word for 'fruit', alluding to the relatively large fruits of this species. The Latin *aequatorialis* allude to '*equator*', the circle of latitude that divides Earth into the northern and southern hemispheres, as well as to the country [Ecuador] where this species is very common; the Latin suffix *-alis* means a close relation, a proximity in a broad sense.

Figure 1. Seed of *Phytelephas macrocarpa* and Victorian sewing items

During the Victorian period, vegetable ivory was very popular to manufacture small boxes to keep needles, thimbles and measuring tapes (Hooker 1849) (Figure 1). Visitors to the Great Exhibition held in Crystal Palace (Hyde Park, London), from May 1st to October 15th, 1851, could saw an unusual ivory tower made by the English firm Benjamin Taylor of Clerkenwell, with the vegetable ivory seeds (Figure 2). This tower is now kept at the Economic Botany Collection, which is part of the vast plant collections of the Royal Botanical Gardens at Kew, located on the outskirts of London. In France, in the Crézancy region, existed a famous industry of plant-ivory products, including buttons, which was severely damaged during World War I (Figures 3 and 4).

Between 1850-1950, vegetable ivory was, along with mother-of-pearl, one of the most important raw materials used in the manufacture of buttons (Figure 5); however, after World War II, the introduction of synthetic products dictated its decline. Nowadays, plant ivory is used to make carved items for home décor (Figure 6) and personal use (Figure 7). Machine-made buttons from vegetable ivory are still made by the biggest world button factories and some of them are in Portugal [www.louropel.org; www.sepol.pt]. Plant ivory is an ethical alternative to the use of ivory obtained from the tusks of elephants, primarily from the African savanna elephant (*Loxodonta africana* Blumenbach 1797), whose trade is prohibited, or severely limited, by international agreements (CITES Appendix I). Plant ivory comes from wild plants, being an economic asset for the sustained management of natural resources.

The Beja Botanical Museum has a collection of circa 3 000 historical photos; including a complete set of twenty postcards that represents the process of making vegetable ivory (corozo) buttons. These postcards were printed in France, in the early 1930's, by *L'Industrie Boutonnière* to advertise and promote its button factory and shows all the process of button making, from the palm seed to the final button (Figures 8 to 27).

Declarations

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Consent for publication Not applicable

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Figure 2. Chrystal Palace vegetable ivory tower (Kew Gardens)

Figure 3. Corozo factory in Crézancy

Figure 4. Workers leaving the corozo factory

Figure 5. Corozo buttons

Figure 6. Vegetable ivory household ornaments

Figure 7. Vegetable ivory personal ornaments

Figure 8. Corozo Palm Grove in the Republic of Ecuador (South America)

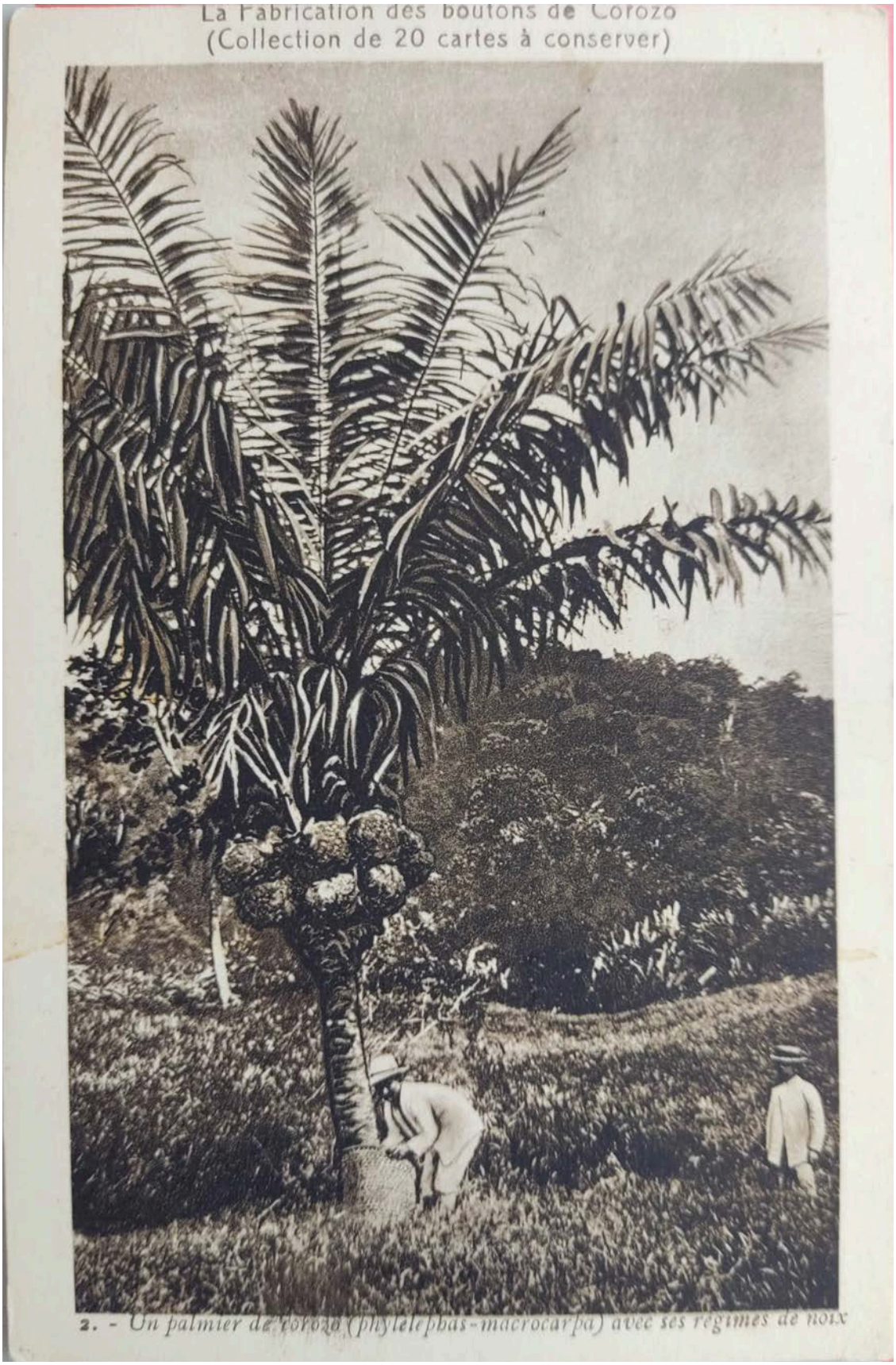

Figure 9. A corozo palm (*Phtelephas macrocarpa*) with its bunches of fruits

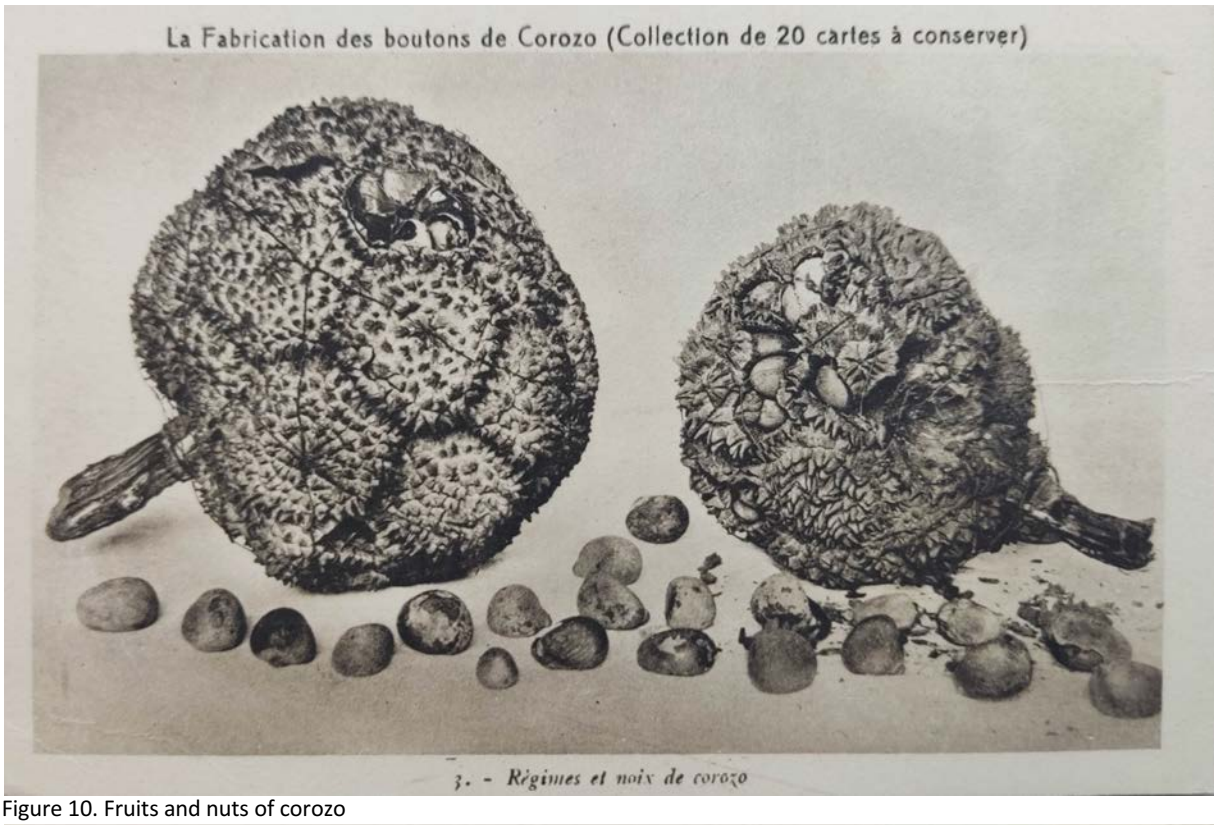

Figure 10. Fruits and nuts of corozo

Figure 11. Threshing corozo fruits to extract the nuts

Figure 12. Corozo nuts, in bags, on the boarding dock

Figure 13. Shipping bags of corozo nuts

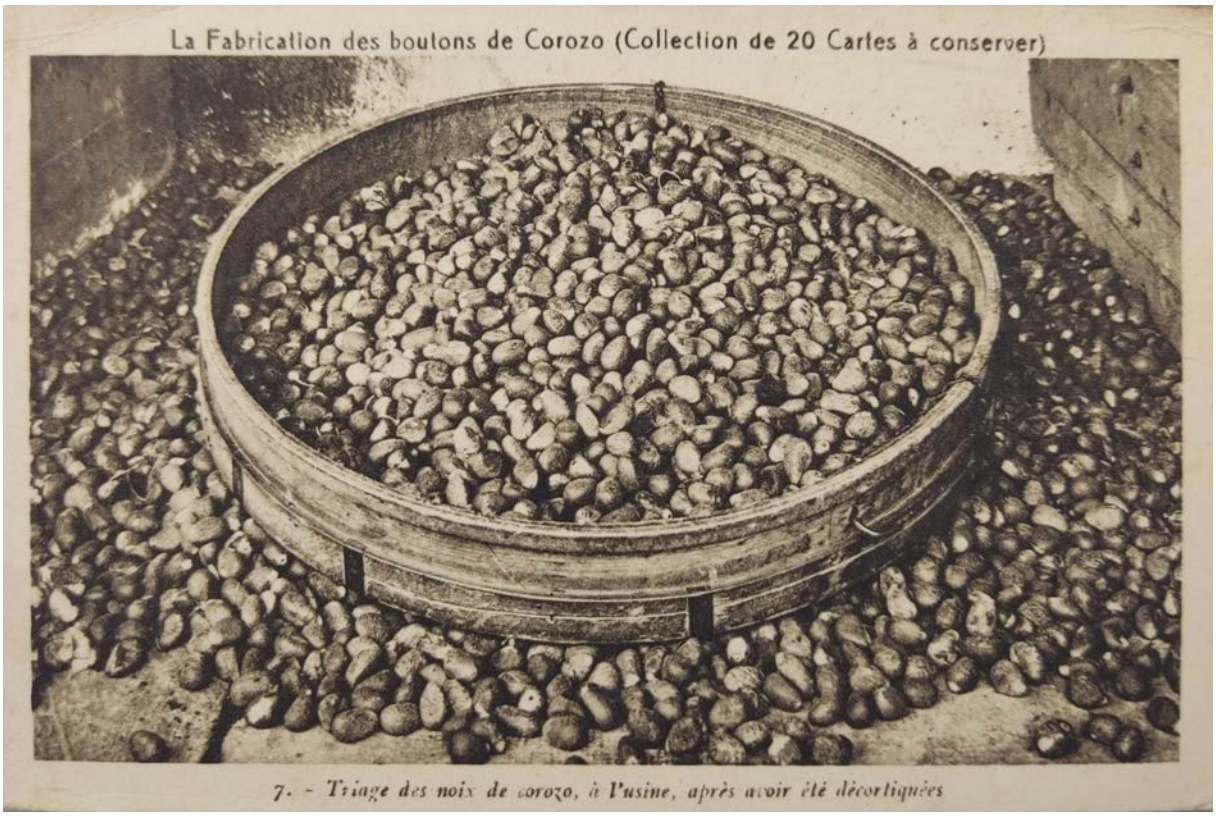

Figure 14. Sorting of corozo nuts, at the factory, after being shelled

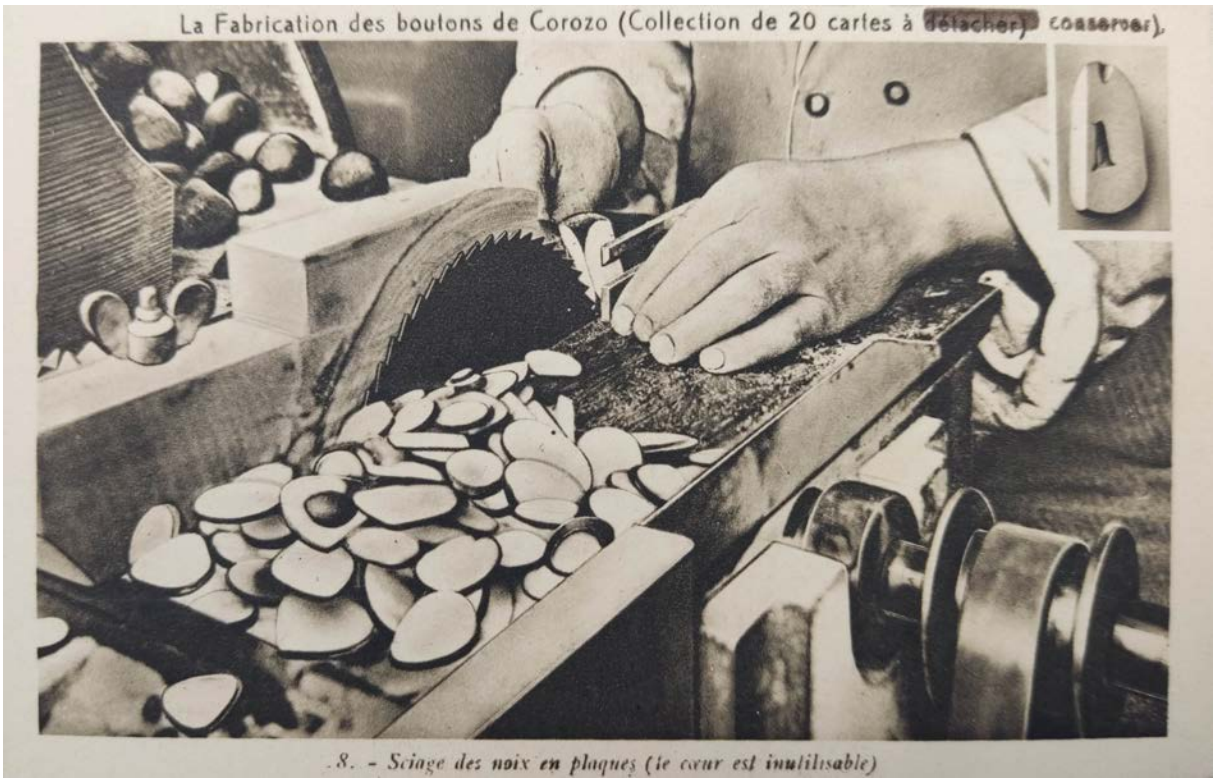

Figure 15. Sawing nuts into slabs (the core is unusable)

Figure 16. Cutting the plates into pawns

Figure 17. Turning both sides of the button-shaped pawn

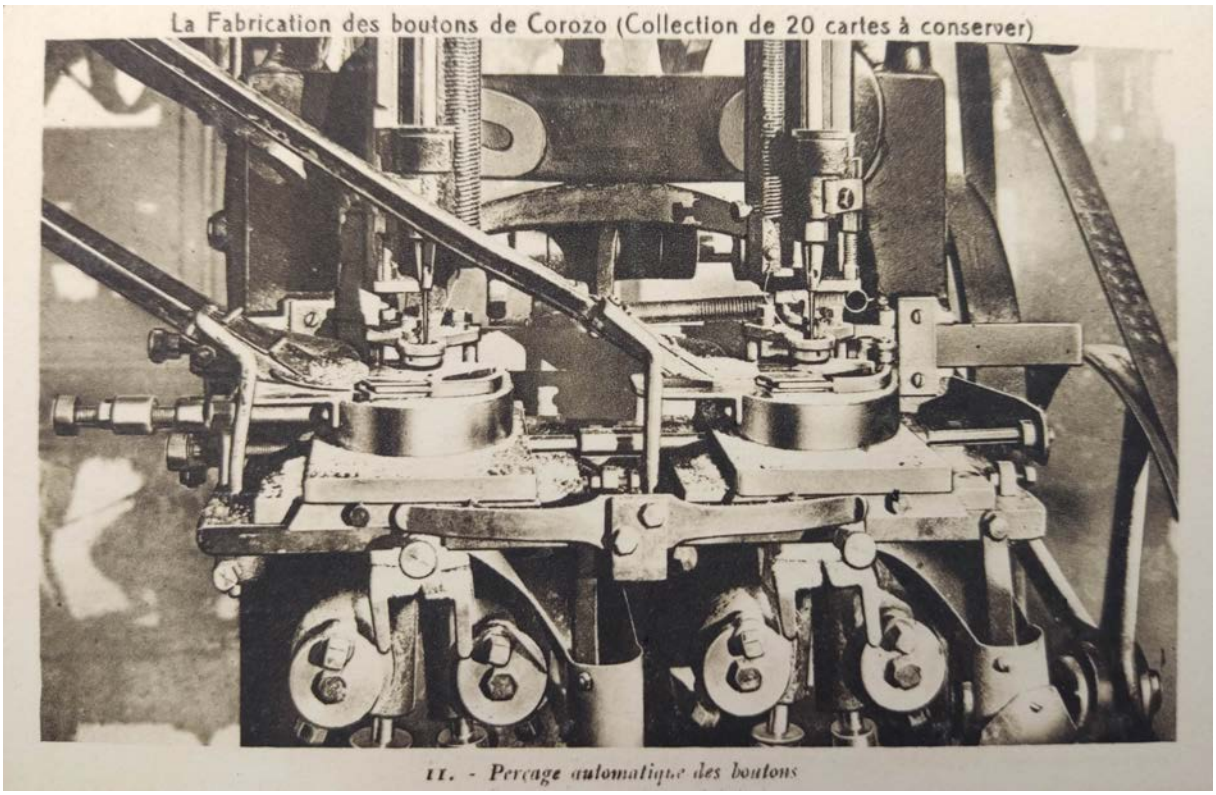

Figure 18. Automatic piercing of the buttons

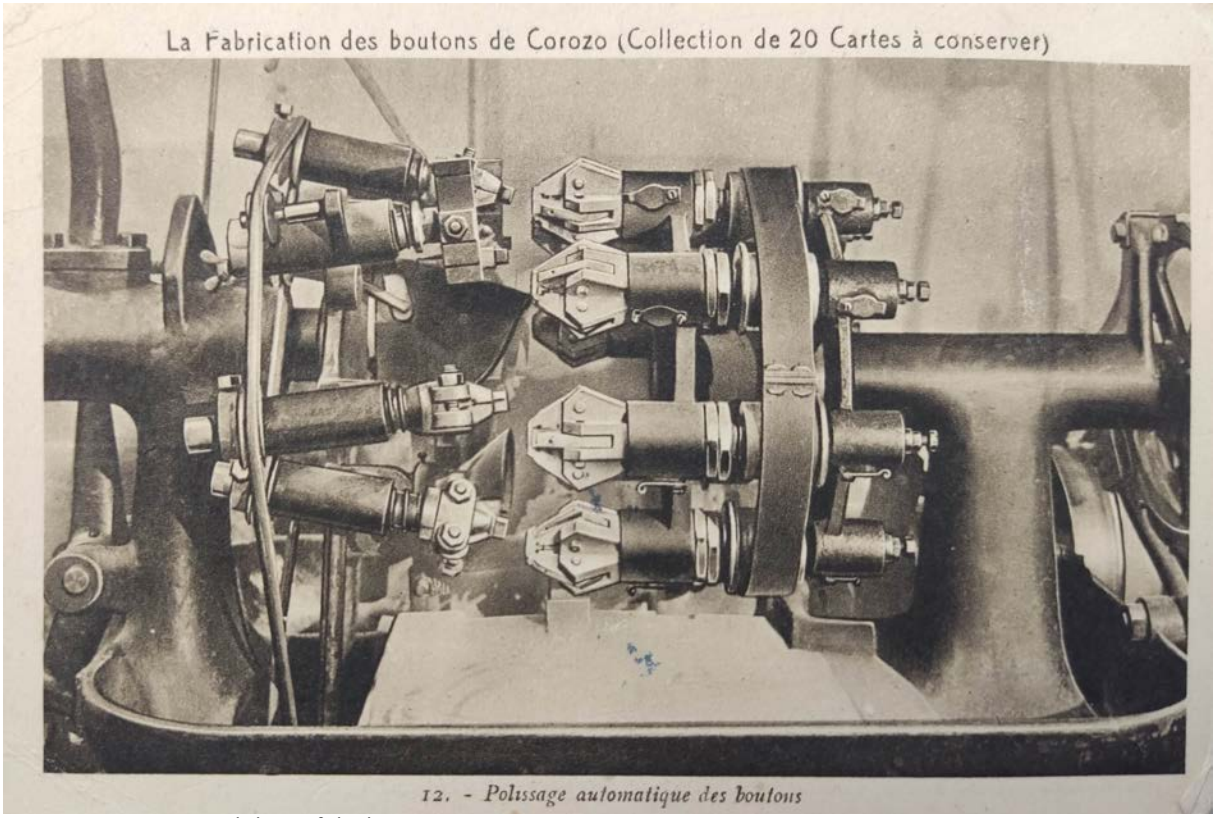

Figure 19. Automatic polishing of the buttons

Figure 20. Printing designs on buttons with stencil and airbrush

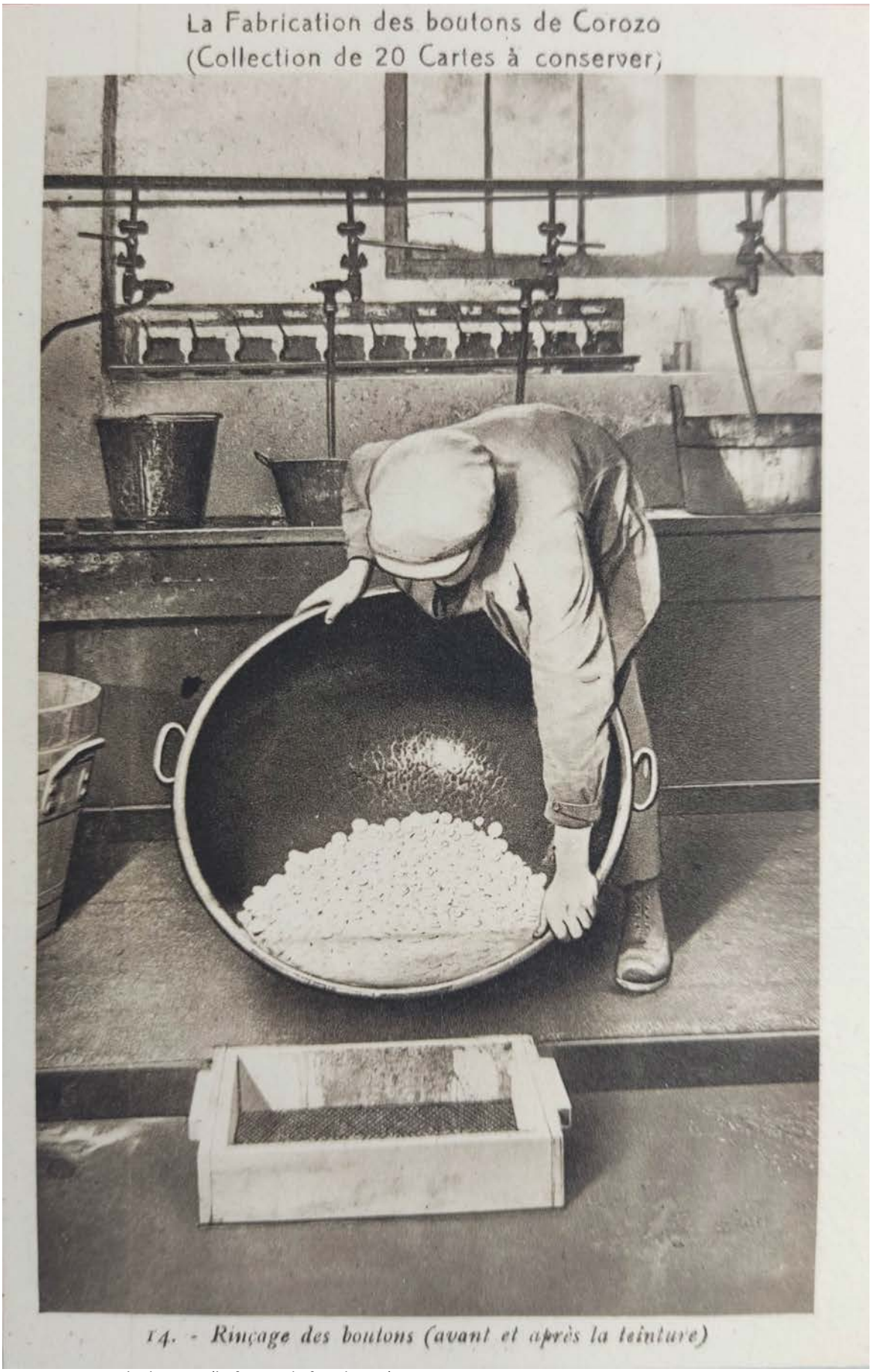

Figure 21. Rinse the buttons (before and after dyeing)

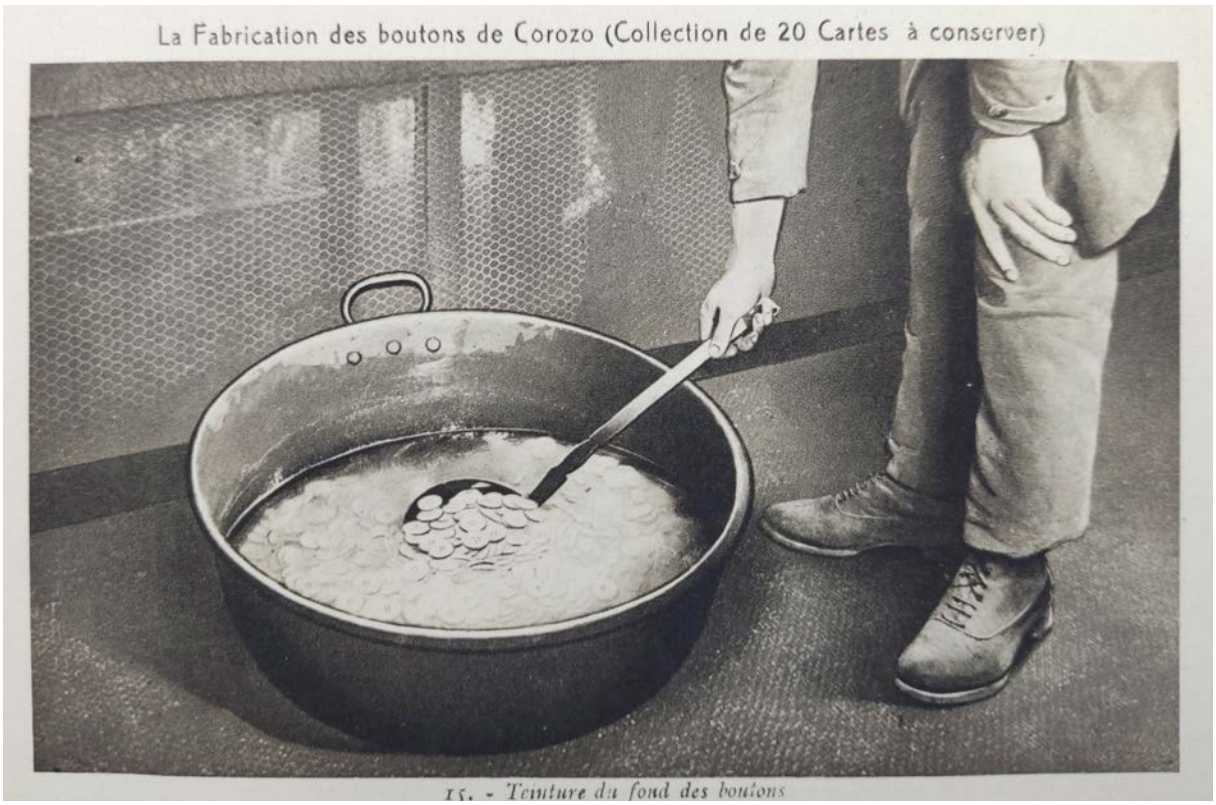

Figure 22. Dyeing the bottom of the buttons

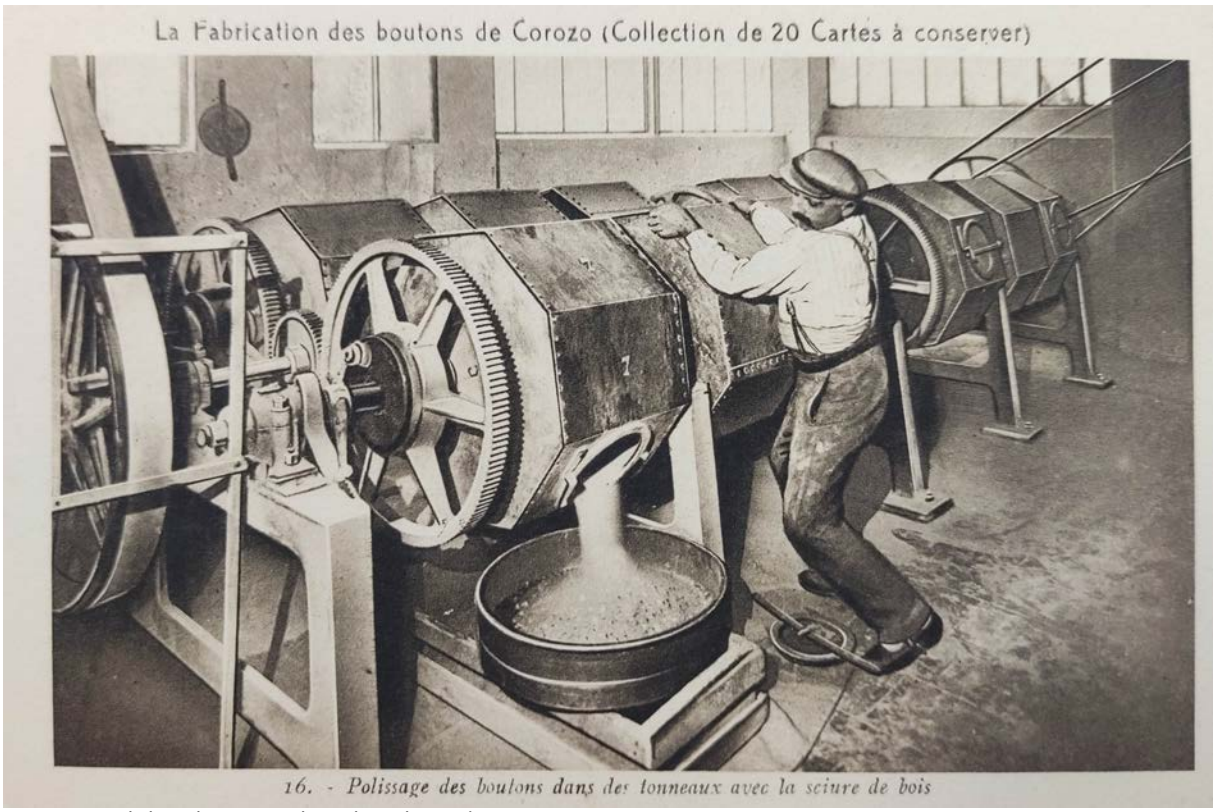

Figure 23. Polishing buttons in barrels with sawdust

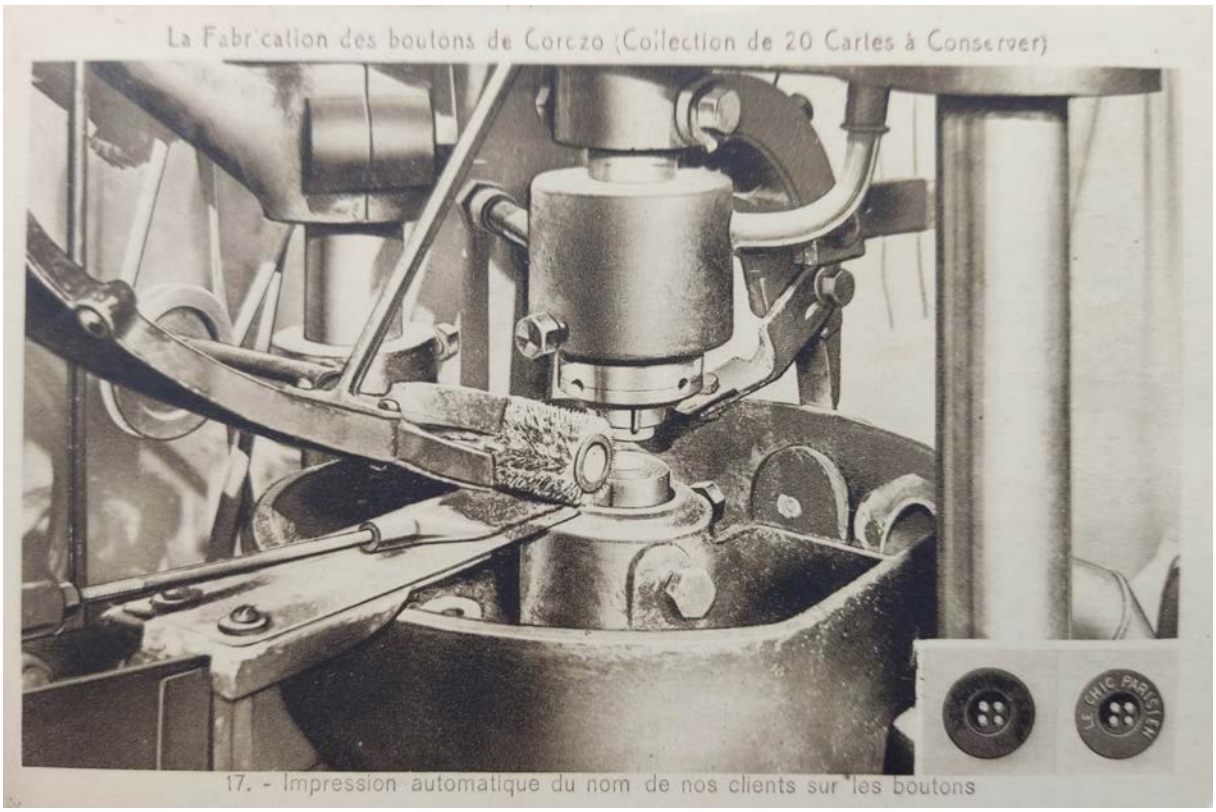

Figure 24. Automatic printing of the name of our customers on the buttons

Figure 25. Sorting and packing the buttons

Figure 26. Table with different phases of corozo buttons' manufacture

Figure 27. The offices of an important corozo button factory – *L' Industrie Boutonnière*, at St. Maur (Seine)

This firm was founded by Raymond Perrot and directed by him until his death, on March 3rd, 1949, at the age of 67. The factory and offices were located at 54 *Avenue de l'Écho* [= today 54 *Avenue Gabriel Péri*], in *Saint-Maur-des-Fossés*, and the firm is mentioned in local business directories from 1921 to 1961 (personal communication by Pierre Gillon, *Président de la Société d'Histoire et d'Archéologie de Saint-Maur-des-Fossés*).

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