Copper-based alloy artefacts from the Témiscamingue fur trade post (Quebec, Canada)

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Abstract

One hundred and forty-four artefacts from the collection of copper-based alloy specimens excavated from the site of Fort Témiscamingue (Western Quebec, Canada; late 16th to 18th centuries) were submitted to instrumental neutron activation analysis. While some specimens were brassy copper (high copper and very low zinc content), others were brass (lower copper and high zinc content). The brass artefacts confirm the indication based on historical documents of the settling of Fort Témiscamingue in the 1720 since metal Zn began to be produced in Europe by the beginning of the 18th century. The brassy copper artefacts could be containers made with 17th century techniques but still in use when Fort Témiscamingue was erected, or they could indicate direct or indirect trade with the French during the 17th century.

Introduction

The Fort-Témiscamingue-Obadjiwan Canadian national historic site (ChGu-2) is located in Duhamel County on the Québec shore of Témiscamingue Lake, five kilometres southeast of Ville-Marie (Rouyn-Noranda-Témiscamingue County). The location is across from a point, on the Ontario side of the lake (Figure 1), where the Saint-Claude Mission (ChGu-1) stood from 1863 to 1887, run by the Marie-Immaculée Oblates. An archaeological dig was conducted on the site in 1994 (Pollock, 1994).

As illustrated by its Algonquin name (*Obadjewong*, *8apaje8awan*: *straight*; as the Fort-Témiscamingue-Obadjiwan Canadian national historic site is known to the Algonquin people today. The term, which has been written in various ways over the years, was already documented in 18th century writings), Fort Témiscamingue and Mission Point form a bottleneck where anyone trying to get through by canoe is easily spotted. The location yields a magnificent view. In 1841, Father Charles Édouard Poiré mentioned that, on a clear day, one can see as far as *7 leagues to the west and 1 league to the east*, the view being blocked on that side by *Île du Collège et Baie des Pères* point.

Taking a look at a regional map (Figure 1) one notes that the site is located midway between the *head* of the lake and the mouth of the Montréal River, which approximately bounds off the Ottawa River and Témiscamingue Lake. The site sits on a bench, on average about three metres above the current lake level. The terrace around the site is very steep. It was solidified by stonework, which protects the shore from the erosion that caused serious problems when the lake overwashed in the early 20th century. The bench rises towards the interior for about one hundred metres, up to a second change in level, which slopes upwards and inland into a mound. Along the south shore, the site turns into a gentle downward slope to the gravelly beach along a large indented bay.

Across from the mission, where the lake bells out again, opens a large, perfectly oval bay, so harmonious a design, it reminds one of a balloon glass painstakingly shaped and rounded by the hand of time (Soulerin, 1884).

Besides the periodically attested Amerindian presence over the past six millennia, the place is renowned as the location where a trading post was established and successively run by various companies (Côté, 2006). The best-recorded periods are those of the Northwest Company starting in 1795, and the Hudson Bay Company, which managed the post in 1821. But traders from Montreal, led by Paul Guillet, had erected a first post under commission by the Governor of the Colony, Pierre de Rigaud de Cavagnal, Marquis de Vaudreuil.

The motives behind setting up a trading post at that precise location remain unknown. However, several factors relative to morphology and geography, along with the nature of the activities that were to be conducted there, can be put forward in as much as those same reasons likely motivated that same choice by their aboriginal predecessors.

The shores of the lake have different morphologies on the Ontario and Quebec sides. The Ontario shores are abrupt and austere. They are reminiscent of the Saguenay Fjord, as stated by the early missionaries. For example, Devil Point is a cliff that rises as high as 120 metres above the water, and dives 300 m below the surface. On the other hand, the Quebec shore is only slightly undulated and is indented by a series of narrow points and bays that are clearly more appealing to visitors arriving on water. That is most likely why it was easier and less dangerous to settle on the east side of the lake.

All in all, it would seem that the Fort-Témiscamingue-Obadjiwan Canadian national historic site occupies a strategic position on the lakeshore. Moreover, when the *a priori* logistic advantages are added in the balance (drinking water, slope, drainage, protection against the elements), the point offers the principal characteristics sought by Amerindian hunter-gatherers, as well as the fur traders that followed in their footsteps.

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Materials and Methods

The copper-based artefacts from Fort Témiscamingue were analysed by means of instrumental neutron activation analysis (INAA) at the U of T SLOWPOKE Reactor Facility. Samples of 10-20 mg were first irradiated serially for five minutes at a neutron flux of 5.0×10^{11} n.cm^{-2}.s^{-1} and assayed for 5 min after a delay time of approximately thirty minutes using germanium detector-based gamma ray spectrometers for Zn, Cu, Mn and In. Elemental concentrations were calculated using the comparator method. Larger samples were irradiated at suitably lower neutron fluxes so that a relatively consistent total amount of radioactivity was produced in each sample.

Medium and long half-life radioisotope producing elements were analysed by batch irradiating 10 to 20 samples per irradiation container for 16 h at 2.5×10^{11} n.cm^{-2}.s^{-1}. After 5 to 9 days, these samples were serially assayed for 500 to 1000 sec looking for Au, Cu, Cd, As, Sb, Ag, Zn and Na. A final counting was made after 9 to 18 days, at which time the samples were counted for 2000 to 8000 sec to determine the concentrations of Sn, Se, Hg, Au, As, Sb, Ag, Ni, Sc, Fe, Zn and Co.

Results and Discussion

Overall, 144 artefacts from the Fort Témiscamingue were analyzed by means of this method. Except for a few cases of cast specimens (medallions, buttons, bracelets and lugs), these specimens are presumably remnants of containers (cauldrons, kettles). More specifically, these containers comprised a body made by hammering a sheet of copper-based alloy, the upper part of the body being generally folded on an iron rod. Two lugs were riveted on opposite sides of the body whether they were made by casting or folding of a small sheet of copper-based alloy on both sides of the containers (Moreau and Hancock, 1999). As reported in Table 1, 122 specimens are mainly fragments of sheets and the majority of them (110) are made of brass. As reported in Table 2, among the 12 other sheet fragments, nine are made of *ca*. 100% of Zn, two, presumably, of pewter (Sn between 66 and 73%, with a calculated lead value of about 30%) and one sheet of 94% Fe. As indicated in Table 3, the 110 fragments of Cu-based alloy exhibit traces of In, an indication of European origin as reported in previous studies (Hancock *et al*., 1991, 1999). These fragments include one *brass* specimen (bottom of Table 3) with a very low Cu content

Table 1. Summary of the artefacts from Fort Témiscamingue analysed with instrumental neutron activation analysis.

Fragment types	Composition	Fragment no.
Non-composite fragments	Very high Zn (ca. 100%)	9
	Very high Sn (66-73%)	2
	Very high Fe (98%)	1
	Very high Cu (94-100%), very low Zn (0.006-0.02%)	63
	High Cu (84-94%), low Zn (5-9%)	4
	Low Cu (65-81%), high Zn (18-33%)	42
	Very low Cu (49%), high Zn (28%)	1
Composite fragments/wires	Sheets with rivets	7
	Rivets	10
	Wires	5
Total		144

Zn, zinc; Sn, tin; Fe, iron; Cu, copper.

Table 2. Non copper-based alloy artefacts from Fort Témiscamingue.

Predominant material	Fragment no.	Description	Mn (ppm)	In (ppm)	As (ppm)	Cu (%)	Ag (ppm)	Au (ppb)	Co (ppm)	Fe (%)	Ni (ppm)	Sb (ppm)	Sn (%)	Zn (%)
Zinc	14	Sheet with hole	12	40	<7	2.7	<47	<62	<4.1	<0.29	<920	21	<0.08	106
	47	Small fragment of sheet	11	7.8	39	0	<34	<52	<3.5	<0.25	<800	3.9	<0.07	100
	40	Small fragment of sheet	11	6.2	29	0	<34	<48	<3.5	<0.24	<780	3.6	<0.07	99
	41	Fragment of sheet	11	5.8	29	0	<24	<36	<2.4	<0.17	<570	2.9	<0.04	99
	45	Fragment of sheet	12	5.5	32	0	<30	<44	<3	<0.22	<710	4.1	<0.06	99
	46	Fragment of sheet	8	7.5	39	0	<36	<50	<4	<0.26	<840	4.1	<0.08	99
	48	Small fragment of sheet	22	6.1	30	0	<29	<43	<2.9	<0.22	<690	3.7	<0.05	99
	49	Small fragment of sheet	7	6.6	35	0	<24	<35	<2.5	<0.17	<560	4	<0.04	99
	44	Big fragment of sheet	10	6	25	2	<35	<51	<3.7	<0.25	<810	2.7	<0.08	97
Pewter	22	Rectangular sheet	67	17	1850	5.4	<60	<1600	<22	<1.3	<180	3700	73	<0.06
	127	Small irregular fragment of sheet with hole	<3.2	19	1600	5.4	<146	<3700	<67	<1.8	<2600	50700	67	<0.22
Iron	30	Small fragment of sheet	770	<0.3	<3.1	0	<11	360	6.9	98.5	<220	4	<0.06	0.02

Mn, manganese; In, indium; As, arsenic; Cu, copper; Ag, silver; Au, gold; Co, cobalt; Fe, iron; Ni, nickel; Sb, antimony; Sn, tin; Zn, zinc.

Table 3. Copper-based sheet fragments from Fort Témiscamingue.

Fragments type	Description (%)	Cu (ppm)	In (ppm)	Ag (ppm)	Au (ppm)	Fe (ppm)	As (ppm)	Sb (%)	Sn (%)	Zn	Period
Brassy Cu	Fragment no.					63					French
Cu: 94-99.9%	Mean	98	1.07	890	3.8	690	4340	250	0.18	0.03	Regime
Zn: 0.01-4%	SD	0.90	0.93	350	4.7	250	2240	220	0.38	0.08	1600-1750
Brass high Cu	Fragment no.					4					English
Cu: 84-93%	Mean	92	0.9	960	4.3	1470	5630	470	3.3	6.2	Regime
Zn: 5-9%	SD	6.3	0.2	150	2.7	1060	4150	360	6.4	1.6	1750-1900
Brass low Cu	Fragment no.					42					English
Cu: 65-81%	Mean	71	8.7	660	6.6	1660	1780	140	0.1	28	Regime
Zn: 18-32%	SD	3.4	8.2	480	7.4	680	2230	150	0.2	3.4	1750-1900
Brass very low Cu	Fragment no.					1					English
Cu: 49%	Mean	49	3.5	787	4.6	1500	1400	115	0.019	28	Regime
Zn: 28%	SD	0	0	0	0	0	0	0	0	0	1750-1900

Cu, copper; In, indium; Ag, silver; Au, gold; Fe, iron; As, arsenic; Sb, antimony; Sn, tin; Zn, zinc; SD, standard deviation.

of 49% Cu (28% Zn). The remaining 109 fragments of sheet made of Cu-based alloy split into three groups (Table 3). The general morphology of these 110 specimens is reported in Table 4. Excluding few artefacts resulting from casting activities, most of these artefacts are fragments of sheets, presumably most of them being parts of containers (cauldrons, kettles).

Sixty-three of them may be assigned to the *brassy* copper-based artefacts category, since their mean Cu is on the order of well over 95% with maximum values of Zn around 4%. Forty-two sheet fragments are yellow brasses with a mean Cu value of about 71% for Cu (range of observed values between 65 and 81%) and a mean Zn value of 28% (range=18-32%). Relative to their Zn content, four specimens of reddish brass would fall between the brassy copper and yellow brasses. Hence, two tight clusters of sheets are noted in the Cu-based artefacts of Fort Témiscamingue. Table 5 reports the elemental composition of i) several composite sheets (generally sheets with rivets) not excluded from the 110 fragments of sheets reported above; ii) several of the rivets of these composite sheets; and iii) the five wires that have been analysed by INAA. The seven sheets of the composite fragments exhibit high Cu and very low Zn; hence, they would be akin to the brassy sheets. The middle part of Table 5 describes the 10 rivets attached to the composite fragments. Their very high Cu values are akin to the High Cu rivet category reported in Moreau and Hancock (1996). It

Table 4. Morphology of the sheet fragments from Fort Témsicamingue.

Morphological categories	Brassy Cu	High Cu	Brass Low Cu	Very low Cu
(Long, very long) (thin) strip of sheet	5		6	
(Rectangular) sheet with holes	4	1	6	
Sliver (small fragment) of sheet	7	7		
Large sheet (20 x 30 cm)	2			
Fragment of (thick) sheet	7			
Sheet (fragment of)	1	3		
(Small) rectangular (square, quadrilateral) sheet	6	1	4	1
Sub-rectangular sheet	3	1		
Rhomboidal sheet	1			
Trapezoidal sheet	2	1		
Triangular (fragment) of sheet	3	1	5	
Crescent shape sheet		1		
Irregular fragment of (thick) sheet	5			
Folded strip/fragment of sheet	7	2		
Narrow bent strip (of sheet)	4	1		
(Wrinkled) lug	2	1		
Rim part of a kettle	1			
Tubular fragment		1		
Fragment of a brass box	1			
Thick corroded needle like object	2			
Thick V shaped piece		1		
Button		1		
Bracelet		1		
Part of rosary medalion		1		
Total	63	4	42	1

Cu, copper.

Table 5. Composite (sheets and rivets) fragments, rivets and wires from Fort Témiscamingue.

Fragment no.	Description	Cu (%)	In (ppm)	Ag (ppm)	Au (ppm)	Fe (ppm)	As (ppm)	Sb (ppm)	Sn (%)	Zn (%)
Composite fragments										
144	Cast lug on 140	93	4.8	1100	8.9	<2000	5620	589	1.76	4.1
86	Large fragment of sheet with three holes and one rivet	97	<0.8	820	9.8	<900	4170	458	<0.02	<0.01
140	Large L shaped sheet with lug and three rivets	98	<0.9	930	1.5	<900	4130	143	<0.02	<0.006
121	Long irregular sheet with four rivets	98	<0.8	1050	1.0	<1000	4350	153	<0.02	<0.006
58	Front sheet of artifact of two sheets and rivet	98	7.8	980	21.4	<2400	1540	1620	<0.12	<0.069
59	Back sheet of artifact of two sheets and rivet	98	8.3	930	20.6	<1700	1190	1700	0.25	0.075
90	Crescent shape with hole and rivet	99	<0.8	1420	1.3	<940	4620	192	<0.04	<0.005
Rivets										
141	Right hand rivet of 140	94	<1.4	640	2.5	<1000	4430	178	<0.09	3.4
143	central rivet for handle of 140	94	4.1	950	7.7	3780	5480	514	1.31	3.8
142	Left hand rivet of 140	96	<0.9	810	2.6	<1300	4410	205	<0.05	3.3
145	Second rivet of 121	96	<1.2	860	0.7	<1600	4100	130	<0.07	0.11
87	Rivet from 86	97	5.1	1030	<0.3	<1200	4170	148	<0.12	0.065
122	Leftmost (first) rivet of 121	98	<0.7	1230	1.1	<1100	4850	183	<0.02	<0.007
123	Third rivet of 121	98	<0.7	780	0.7	<600	4460	115	<0.05	<0.009
146	Fourth rivet of 121	98	<1.4	1060	<0.3	2900	4820	160	<0.13	0.069
60	Rivet of artifact of two sheets and rivet	98	7.3	930	20.4	<910	1390	1680	<0.04	0.05
91	Rivet from 90	99	<1.1	1060	1.9	<3000	4200	161	<0.20	<0.02
Wires										
64	Thin wire	70	<0.7	< 19	0.2	17100	<8	3.7	<0.04	27
65	Thin wire	99	<0.7	21	0.2	<340	<15	0.4	<0.02	0.045
70	Thick wire	99	<0.8	11	0.05	<180	<2.5	< 0.1	<0.01	0.012
55	Thick wire	99	<1	11	0.05	<150	<2.8	0.3	<0.01	0.011
37	Thick wire	99	<0.7	50.1	1	<660	<10	2.8	<0.04	<0.004

Cu, copper; In, indium; Ag, silver; Au, gold; Fe, iron; As, arsenic; Sb, antimony; Sn, tin; Zn, zinc.

Figure 1. Location of Fort Témiscamingue.

should be enhanced that, as reported in this publication, this High Cu category far outnumbers the Low Cu (brass) rivets (33 against 7 specimens). The third part of Table 5 reports the elemental composition of five wires, all but one of very high Cu value, akin to the rivets reported above. Hence these wires could have been used for riveting. One wire exhibit a value of 70% of Cu, akin to the few low Cu rivets reported in Moreau and Hancock (1996).

Conclusions

In as much as Zn content may be considered as time sensitive with increasing importance of Zn between the late 16th and the 18th century (Moreau and Hancock, 1996; Pollard, 2008), the brassy copper sheets could be early material of the French Regime; in fact these sheets may represent material that could predate the installation of Fort Témiscamingue; in short they could represent fur trading activities at its onset in the first half of the 17th century.

The brass artefacts would represent occupation of the Fort Témiscamingue itself beginning by the 1720. The nine sheets of *ca.* 100% Zn would also sustain such late occupation since the inception of techniques producing Zn metal date at the earliest in Europe to the 1740 (Richards, 2010).

In summary, two very tight and contrasted clusters of brassy copper and yellow brass reported above could be the result of intensive trading activities in the early 17th century and during the late French and the English regimes (1720 onward) while these activities may have been of limited importance at the closing of the French regime (1675-1725). However, the possibility cannot be ignored that several and maybe all of the brassy copper fragments were 17th-century containers that were still in use in the 18th century and, would thus be contemporaneous with the 18th century brass artefacts not by their fabrication but by their utilization. Such observation at Fort Témiscamingue is also noted elsewhere: hence, Moreau and Hancock (2011) report that at Brador there also seems to be a noticeably less intense occupation between an early occupation during the first half of the 17th century and a later (post-1704) occupation. Thus, far from the colonizing areas between Québec and Montréal, on the North shore of the Saint-Lawrence, the western (Témiscamingue) as well as the eastern (Brador) areas of New France exhibit a similar historical trajectory, as long as the elemental compositions of Cu-based alloy artefacts are concerned. On a technical side, compaired to the sheets making up the cauldrons, riveting seems to be done much more often with high-Cu objects as illustrated by the rivets themselves and by the several wires included in the sample of artefacts from the Témiscamingue trading fort.

References

Côté M, 2006. [L'occupation amérindienne au Témiscamingue: l'exemple du Lieu Historique national du canada de Fort-Témiscamingue/Obedjiwan]. [Article in French]. Rech Amerindien Que 36:7-22.

Hancock RGV, Farquhar RM, Pavlish LA, Salloum R, Fox WA, Wilson GC, 1999. North American native copper and European trade copper analyses. In: E. Pernicka, G.A. Wagner (eds.) Archaeometry-90. Birkhaüser Verlag, Boston, pp 173-82.

Hancock RGV, Pavlish LA, Farquhar RM, Salloum R, Fox WA, Wilson GC, 1991. Distinguishing European trade copper and North-Eastern North America native copper. Archaeometry 33:69-86.

Moreau J-F, Hancock RGV, 1996. Faces of European copper alloy cauldrons from Québec and Ontario 'contact' sites. In: S.M.M. Young, A.M. Pollard, P. Budd, R.A. Ixer (ed.) Metals in antiquity. Archaeopress, Oxford, pp 326-40.

Moreau J-F, Hancock RGV, 1999. [L'anatomie d'un chaudron]. In: J.-F. Moreau (ed.) [L'Archéologie sous la loupe. Contributions à l'archéométrie]. [Book in French]. Recherches amérindiennes au Québec ed., Montréal, pp. 73-86.

Moreau J-F, Hancock RGV, 2011. Copper-based kettles from Brador: a contribution to the study of eastern settlements of New France on the northern shore of the estuary of the Saint-Lawrence (Quebec, Canada). In: Proceedings of the 37th International Symposium on Archaeometry, 13th-16th May 2008, Siena, Italy, pp 611-6. Springer.

Pollard AM, Heron C, 2008. Archaeological chemistry. RSC Publishing, Cambridge.

Pollock J, 1994. Final report archaeological test excavations site ChGu-1, Oblate mission (mission Saint-Claude) Lake Temiskaming, Ontario. Report prepared for Temiscaming Abitibi Heritage Association, Haileybury.

Richards AW, 2010. Zinc processing. In: Encyclopaedia Britannica, ultimate reference suite. Encyclopaedia Britannica ed., Chicago, IL, USA.

Soulerin A, 1884. [Le père Laverlochère: missionnaire Oblat de Marie-Immaculée: apôtre de la Baie d'Hudson]. [Book in French]. Delhomme et Briguet, Paris.