

**ACCOUNT OF A CHEMICAL
EXAMINATION OF THE CELTIC
ANTIQUITIES IN THE COLLECTION
OF THE ROYAL IRISH ACADEMY,
DUBLIN**

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Account of a Chemical Examination of the Celtic Antiquities in the Collection of the Royal Irish Academy, Dublin by John William Mallet

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JOHN WILLIAM MALLET

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D. J. W. Mallet from W. Dingle
1852

ACCOUNT

OF

A CHEMICAL EXAMINATION

OF

THE CELTIC ANTIQUITIES

IN THE

COLLECTION OF THE ROYAL IRISH ACADEMY, DUBLIN.

INAUGURAL DISSERTATION FOR THE DEGREE OF DOCTOR,

ADDRESSED TO

THE PHILOSOPHICAL FACULTY

OF THE

University of Göttingen,

BY

JOHN WILLIAM MALLET.

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1852.

instances has the assistance of chemical analysis been made use of in the investigation of antiquities, and this, perhaps, for several causes. Not many persons have pursued the study of chemistry along with archæology to a sufficient extent to render the former really serviceable to the latter; and those antiquarians who possess no acquaintance with this valuable engine of research have probably undervalued the importance of its application to their own purpose. Another reason, too, which has undoubtedly contributed greatly to deter the proprietors of fine specimens from permitting a chemical examination of them is the fear, sometimes exaggerated, of the injury likely to be sustained by them in the process. Hence, with the exception of the analysis of some bronzes, but little attention has hitherto been directed to investigation in the direction referred to.

Being anxious to undertake a somewhat extended research of this kind, and convinced that really valuable information could only be obtained by subjecting to analysis a considerable number of carefully selected, and as far as possible, *typical* specimens, I applied to the Council of the Royal Irish Academy, whose collection of Celtic antiquities is one of the most valuable and extensive in existence, for permission to obtain such from their Museum. This was immediately granted, and every facility has been given me in procuring fragments of really fine and illustrative specimens (at the same time taking care to injure none of these in external appearance). The greater number of these articles are metallic; the universal applicability of the metals for purposes of peace and war, of use and ornament, rendering everything calculated to throw light on the materials and processes employed in ancient metallurgy most important in a research of this nature. Some of the others, however, as coloured beads and pigments, are very interesting as illustrative of the state of Art at that remote period.

Commencing, then, with the ancient metals and alloys, the first to be described are the

GOLD ORNAMENTS,

of which class of Celtic antiquities I have seen no record of any previous analyses. In these the collection of the Royal Irish Academy is exceedingly rich, gold torques, gorgets, armlets, and other decorations for the person, being found in great number in Ireland;* indeed, it is said, that scarcely any large tract of land in this country is for the first time cultivated in which there are not some such discovered, and perhaps the larger portion of these are never seen by the public, the finders frequently melting down and selling them for the mere value of the gold.

Of this metal I analysed eight specimens, viz. :

No. 1. Fragments of a "torque" or ornament supposed to have been worn round the neck. It consists of a single strip of thin plate gold twisted so as to form a spiral, this being then bent into a circle, and the ends turned into two small hooks by which the torque was clasped. The ornament had been broken up by the finder into pieces of about two inches long, but when entire it must have been ten inches in diameter. The part examined consisted of the two end hooks. The colour of the gold was a pale, rather sickly yellow, and its specific gravity was 15.377.

No. 2. Fragment of a torque similar to No. 1, and most probably found along with it in the County Sligo; but the locality of neither is certain. This specimen, which was of a rather deeper yellow colour than the last, was from the middle of the torque. Its specific gravity = 15.444.

* All the articles I have examined are from this country, as are, indeed, almost the whole of those contained in the public collection from which they were taken.

No. 3. Portion of a twist of wires of about one-tenth of an inch in diameter each, the whole length of the twist, which is straight, being about six inches. Locality unknown. This *may* have formed part of a bracelet, but there is no second specimen in the Academy Museum, and from its workmanship it does not seem likely to be by any means of so ancient a date as the majority of these gold ornaments. The colour was a very deep rich gold yellow, and the specific gravity = 18.593.

No. 4. Two fragments of a lunette-shaped ornament made of very thin gold plate, and having a little pattern round each edge. The whole must have measured ten or twelve inches across, and the greatest breadth of the flat plate itself was about two inches. It was, in all probability, a gorget or ornament either for the neck or head, similar to many others preserved in the Museum of the Academy. The locality of the specimen is unknown. It is of about the same colour as standard gold, and of specific gravity 17.528.

No. 5 was a small plate or spatula of gold, about an inch and a half long, and a quarter of an inch wide. It was probably *unmanufactured* gold, not intended for any special use in its present form. It is not known where it was found. The colour is a little lighter than that of No. 4, and specific gravity = 17.332.

No. 6. Fragment of very thin plate gold, which formed part of a boss or concave ornament about four inches in diameter, very like those which cover the ends of the ornaments supposed to be diadems in the Academy Museum. Locality unknown. It was of nearly the same colour with No. 4, and its specific gravity = 15.306.

No. 7. Specimen of Celtic ring-money. It consisted of a bit of gold-wire of about three-fourths of an inch long, and nearly one-eighth of an inch in diameter, bent into a circle,

the ends being quite close, but not fastened to each other. It has been asserted by Sir W. Betham* that these rings used for money were made of graduated weights with reference to the unit of twelve grains, or half-a-pennyweight troy. This specimen weighed 62.13 gr., or 2 dwt. 12 gr., - five of Sir W. Betham's units, and 2.13 gr. over. Colour about the same as No. 5, specific gravity = 17.258.

No. 8. Another specimen of ring-money. It was rather larger than No. 7, but composed of thinner wire. The colour was very much the same with the last, and specific gravity = 16.896. Its weight was 30.04 gr., which is exceedingly close to 1 dwt. 6 gr., or $2\frac{1}{2}$ of Sir W. Betham's units. Hence, it was about half the weight of No. 7. The localities where these specimens of ring-money were found are not known.

The results of the analyses† of the gold ornaments are as follow :—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
Gold, . .	71.54	79.48	96.90	88.64	88.72	81.10	86.72	85.62
Silver, . .	23.67	18.01	2.49	11.05	10.02	12.18	12.14	12.79
Copper, . .	4.62	2.48	Trace.	.12	1.11	5.94	1.16	1.47
Lead, . .	Trace.	. .	. .	. .	. .	.28	Trace.	. .
Iron, . .	. .	. .	. .	. .	.02	. .	Trace.	. .
	99.83	99.97	99.39	99.81	99.87	99.50	100.02	99.88

We observe here considerable diversity of composition, and on the whole the existence of a greater amount of alloy than one would perhaps expect from reading the accounts

* Transactions of the Royal Irish Academy, vol. xvii., *Antiq.* p. 7.

† The process of analysis calls for no particular remark, except that the gold was precipitated by making the solution nearly neutral by evaporation, and adding (hot) a slight excess of sulphate of ammonia, which re-agent throws down the metal in the form of a compact sponge, and does not produce the effervescence occasioned by the use of oxalic acid.

of gold ornaments to be found in various books on antiquities, in which they are frequently described as of "pure gold," "fine gold," &c., the colour being apparently very often the only guide to such a belief. Although the analyses here given differ much from one another, yet we find some traces of connexion between the composition of the alloys and the forms into which they were manufactured.

Thus, Nos. 1 and 2 are greatly below the standard of the others, and these are both specimens of the same kind of ornament, the torque, and the only specimens examined. They do not differ much from the composition of the electrum of the ancients as given by Pliny and others.*

No. 6 is about on a par with these as to the quantity of gold, but contains a larger proportion of copper, and less silver.

Nos. 7 and 8 accord very closely with each other, a circumstance particularly interesting from their having been in all probability used as money. That rings of the precious metals were used for this purpose at a very early period there seems to be very little doubt. In Sir W. Betham's memoir on this subject he quotes the fact, that fresco paintings have been found in the tombs of Egypt exhibiting people bringing, as tribute to the king, bags of gold and silver rings, and that on the western coast of Africa rings of copper and iron with expanded ends, exactly resembling some of those discovered in Ireland, were found in use as a circulating medium among the natives, in consequence of which, similar ones have been manufactured

* "Ubiunque quinta argenti portio est, electrum vocatur."—*Plinii Hist. Nat.* lib. xxxiii., c. 4.

"Alia (species electri) ex partibus auri tribus et una argenti conflatur."—*Margherita Philosophica.* Basil, 1523.