REVUE BELGE
DE
NUMISMATIQUE
ET DE SIGILLOGRAPHIE

PUBLIÉE
SOUS LE HAUT PATRONAGE
DE S. M. LE ROI
PAR LA
SOCIÉTÉ ROYALE
DE NUMISMATIQUE DE BELGIQUE
ET SUBSIDIÉE PAR LE
Ministère de l'Éducation Nationale
et de la Culture Française
et par le Ministère de la
Culture Néerlandaise

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Opvoeding en Franse Cultuur

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CXVIII - 1972

BRUXELLES BRUSSEL
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CLASSIFICATION
OF THE TRAMS OF LEVON I
OF CILICIAN ARMENIA

(Planches XI-XIII)

The medieval kingdom of Armenia lay far away from Transcaucasia, in the extreme south-eastern part of Asia Minor, beyond the Cilician Gates. Its Mediterranean ports in the Gulf of Iskenderun, namely Tarsus, Adana, Mamistra, Portella, and Ayas, enjoyed a similar strategic location in relation to the commerce of the Levant, and the caravan trade coming west through Aleppo, as the nearby Crusader citadel of Antioch. The first king of Armenia, Levon (Leo) I, received his royal sceptre from the German emperor. Whereas very few coins of the Roupenian barons of the twelfth century are known, and very few of Levon himself before he became king, his reign thereafter (1199-1219) was marked by a flood of silver coinage. His trams (drachmae), weighing about 2.9 g. and of good silver, had at least ten times the intrinsic value of the deniers which were the standard silver denomination of the Latin East in the twelfth and early thirteenth centuries. The tram was more valuable even than the Venetian grosso, introduced at about the time of the Fourth Crusade, and by the standards of the day was a very large silver coin. It was identical in size and weight with the dirhams of the Seljuks of Rum. These sultans were the neighbours and natural enemies of the Roupenian dynasty, but their destinies were linked while Armenia controlled the outlets to the Mediterranean world and to the quickening currents of prosperity of the thirteenth century. This was the situation until the Mongol incursions and the battle of Kose Dagh
in 1243, soon after which (1245) the Armenians entered into an alliance with the Mongols. The copious issues of Seljuk dirhams begin only in the reign of Kai-Qubâd (616-34 H./A.D. 1219-36), that is, towards the end of the reign of Levon I, and they must therefore be interpreted as a consequence, and not the source, of the enormous quantities of silver that Levon was able to coin. King Hetourn I was equally fortunate, at least in the earlier part of his reign (1226-71), before the death of his consort Zabel in 1252. From then on, the Armenian silver coinage began a long decline. Its Blütezeit coincided closely with the first half of the thirteenth century.

Apart from some very rare gold coins, three successive issues of coinage are attributed to Levon I, of which the first two are scarce. The first consisted of double-trams and their halves and quarters, struck perhaps at Tarsus in the years 1196-99. The second are a special coronation issue, with a design which shows the anointing of the king in 1199. The third, substantive issue of trams shows on one side the king enthroned — a design borrowed, apparently, from German bracteates, or at least from the German iconographical tradition — and on the other side two lions (appropriately for a king Leo) standing facing each other on either side of a standard cross. It is the «two lion» trams which are discussed here, on the basis of two parcels totalling nearly a thousand specimens that came to hand recently.

The type exhibits a considerable degree of variation in style and in the exact form of the legends, which combine to yield an almost endless series of minor varieties. The numismatist's task is to establish a classification which should correspond with the minting arrangements and the chronological sequence of issue. The most certain way to do this is to make a comparative study of the contents of several hoards, placing them in order and showing, as it might be, that the earliest hoards contain only varieties 1 and 2, that a middle group of hoards contains varieties 1 to 5, with variety 1 already in worn condition, and that a late group is made up predominantly of varieties 3 to 8. This classic method of study is not possible, because no hoards are adequately recorded. Sibilian studied a hoard of 500 trams and noted that 15 main varieties could be distinguished. His general conclusion (almost certainly going beyond the evidence) was that there was a gradual deterioration
in the artistic quality of the coins in the later years of Levon's reign. But he did not publish his observations in such a form that later students could build on them. Garabetian proposed a classification based on the style of the cross of the reverse, and suggested that a new cross design was used each year, and that each die-cutter had his own version of the obverse legend, while varying the reverse legend for each month of the year. The mind boggles at the quality of evidence that would be needed to demonstrate the truth of so ingenious a hypothesis. Bedoukian, whose monograph (1) is the standard work on the coinage of Cilician Armenia, and whose knowledge of the series is unrivalled, rejected Garabetian's scheme for sufficient reasons, and adopted the obverse inscription as the key to his own elaborate classification, combining with it observations on the artistic quality of the dies, the presence or absence of a footstool, and so on. In more than seventy pages of catalogue, he lists 96 varieties (not counting errors, oddities, etc.). With respect it must be said that Bedoukian's classification does not commend itself, in that very few of his varieties show any internal consistency in the form of the cross on the reverse, such as might have seemed to validate the scheme. It is, in its nature, a largely mechanical arrangement according to insignificant variations in the legends, — in fact, a non-classification. There is no reason to think that its logic bears any close relationship to the order in which the coins were produced; and the catalogue is an unworkable basis on which to list hoards. As a key to the interpretation of the monetary history of three decades, it offers little hope of progress. In accepting the plausibility of such a jumbled arrangement, Bedoukian was perhaps unduly influenced by the conclusions from his own meticulous and distinguished study of two hoards of trams of the succeeding reign. There, he found a great deal of cross-linkage of formal varieties, firmly proved by die-links (2), in a coinage with an impressively high survival-rate. There is, as we shall see, cross-linkage or "muling" among the trams of Levon I also, but it occurs in ways that are restricted and definable.

None of the three earlier classifications — of Sibilian, Garabe­
tian, or Bedoukian — can be put to the definitive test, namely
confirmation from an adequate hoard-sequence, and until they
can be so tested they remain conjectural. Only by the patient
collection of hoard-evidence will the problem eventually be solved.
The argument is, however, to some extent circular, in that the
hoards cannot be properly recorded until the varieties have been
defined. This procedural problem should not be underestimated.
Bedoukian's listing of the large and potentially very useful Mersin
hoard, for example, is made within the framework of his 96 varieties,
and regrettably the drawings of the reverse crosses printed in the
catalogue are not sufficiently informative to permit a re-listing
in accordance with the correct stylistic groups. The purpose of
this article, therefore, is to establish the basis of a classification of
Levon's trams, in a way that will, it is hoped, stand up to critical
examination, and prove serviceable in the future for the description
of hoards. The doctrine upon which the whole argument rests
is that, where cross-linkage or « muling » are in question, or may be
in question, classifications of the obverses and reverses must in
the first instance be made separately — and then combined.

The opportunity of studying the trams of Levon I arose when
Mr. C. H. Subak very generously made available for research a
parcel of some 800 trams acquired in Germany. Some were white
and clean, some had a distinctive and very resistant blue discolora­
tion, and a few were intrusive coins from a hoard more than a
hundred years later in date. A few months subsequently Mr. S.
Bendall, with equal kindness, lent the writer another parcel of
nearly 200 coins, bought in London from a Turkish visitor to
the country. They proved on examination to be some white, some
blue, and some later intruders — « the mixture as before ». Whether
two large hoards of Levon I had been mixed at a common source,
and contaminated with some worn and otherwise worthless coins
from a third find, it is difficult to say. Dr. Bedoukian was good
enough to look at the larger parcel, and formed the opinion that
they might have been picked over. The « white » and « blue »
coins were studied separately, and a metrological examination
showed that the latter were consistently a little lighter; but the
structure of the parcels, in terms of the varieties that will be de­
fined below, was very similar.
If one spreads out a few hundred trams of Levon I on the table, arranging them together, like with like, according to the style of the cross on the reverses, and if one then without altering the arrangement turns all the coins over to compare their obverses, it quickly becomes apparent that there is a restricted number of broad stylistic groupings, and — most important — that obverses and reverses march together. Certain elements in the design, particularly the central cross on the reverse, the drapery of the royal vestments on the obverse, and the presence of a group of three dots, either as a field-mark on the obverse or as part of the reverse design, permit a relatively simple first classification of the great majority of the specimens, which should in principle correspond with the arrangements for the cutting of the dies, and, by extension, should give the clue to the broad grouping and the order of issue of the endless minor varieties that can be distinguished among the trams.

When the stylistic varieties have been listed, the next steps to be taken are 1) to search thoroughly for any specimens which contradict the classification by combining obverse and reverse styles that are normally separate. Such coins, which should be relatively few in number, would serve to link the groups together and show their relationship to each other; 2) to check the metrology of the larger groups in order to see whether there are any noticeable internal differences, either in the average weight of the coins, or — more probably — in the range of weights on either side of the average, such as would indicate more careful or less careful workmanship in the preparation of the planchets. Any clear metrological differences between the varieties would help to confirm that the arrangements for sharing out the work of cutting the dies were carried over into the subsequent stages of coin production.

The cross on the reverse shows many variations, some of which are obviously regular and intentional, and others which may turn out to be of minor importance, and which can be conflated with one of the principal varieties. The more obvious forms are shown in Fig. 1, where they have been arranged in related groups, according to the shape of the central element of the cross. There are six or seven basic shapes, namely a boldly-seriffed T (nos. A 1-4);
a similar shape composed of a horizontal bar with a dot below (B 1-4); a bar of pseudo-seriffed or waisted outline, usually with 3 dots at the base of the staff (C 1-4); a cross with an elongated upper limb, often with an initial-star instead of an initial-cross in the legend (D 1-5); a Greek cross (E 1-3); and a triple or rayed cross (F 1-4). There is also a « patriarchal » cross, which is easily recognized in one of its forms (G 1), but which would probably be mistaken for variety A in its others (G 2-3). To show that G 2-3 is in fact a separate grouping, it is necessary to analyse other stylistic details of the reverse dies, such as the style of the lettering, or the anatomy of the lions, and to show, for example, that the lions are drawn in one way on variety A and in another on G. Correlation between the version of the cross and the style of the lions is an essential part of the argument when it comes to distinguishing the « hands » of different die-cutters, since details such as the arrangement of dots in the lions’ manes can be assumed to
be without intentional significance. Also, it will turn out that
the stylistic arrangement of the reverses is not quite so simple as
the crosses may suggest, and that there are, for example, quite
a lot of specimens with « B » type crosses but « A » type lions, which
really belong with reverse group A. The rubric H has been left
for a simple form of cross found on the « AMEN » coins, about
which more will be said below. Finally, J is an omnibus classifica­
tion for the relatively scarce coins with dots added in the angles
of the cross. Some of these coins with dots are plainly part of one
or another of the varieties A - G, and where this is obvious (as
with J6 = D3, and J7 = D4) they have been transferred to their
proper place. It will perhaps be possible to transfer other J vari­
eties to a more suitable place in the classification, when further
evidence is available.

A preliminary examination of the coins is enough to show that
the reverse varieties A and B are predominant, C, D, and G are
common, and E, F, and J are scarce.

Next, we turn the coins over, to find that the obverse styles
are fewer in number, although in one of them there is a series of
gradations in the drapery, the significance of which will have to
be explored. The analysis is hampered by the imperfect striking
of many of the obverses. Fortunately, two or three of the obverse
styles are entirely distinctive and could not possibly be confused
with the others even when badly struck. The structure of the
characteristic forms of drapery is sketched in Fig. 2. The first
four drawings have been labelled 1a, b, c, and d, because they
appear to be related in style. These coins vary a good deal in
quality and elaboration, but one may guess that the differences
are no more than the range that might be produced by one die-cutter
over a period of some years. Note the vertical shading over the
right knee (to the observer's left) in 1b, c, and d ; the triangular,
pointed foot in a diamond-shaped fold of drapery ; and the « chains »
of dots in 1a and b. Obverse dies of variety I often have three
dots added in the field.

Variety II is elongated and elegant, and shows little variation.
There is no problem in recognizing variety III, as the shoulders
are distinctive. IIIa, b, and c are conceptually related to each
other, although not very closely ; the proof that they belong to­
ether is that they occur almost exclusively with reverse type C.
IVa, b, and c are again rather varied in appearance, but are dis-
tinctive in style. Conclusive proof of their association with each other and with reverse type F is available from die-links.

The obverse/reverse combinations I/A, II/B, III/C, I/D, I/E, IV/F, II/G, and II/H account for the vast majority of the available specimens. All these are regular or substantive combinations, unlike the cross-links or mules which may rest on very scarce or even unique specimens. The balance of the evidence allows us to conclude that the stylistic criteria that have been isolated are true criteria. The groupings may in principle reflect either successive or concurrent blocks of issues, or a combination of both. Eventually hoards should put the chronology beyond doubt. Meanwhile the evidence of coins which link the blocks is of special interest. The examples of cross-linkage discovered in the « white » and « blue » parcels are as follows.

Reverse C is often associated with obverse II. This appears to be a substantive arrangement rather than a mule, and it is the exception to the rule that each reverse type has only one associated obverse type.

Reverse C occurs (rarely) with obverse IVb, and conversely reverse F occurs with obverse IIIb. This appears to be a reciprocal link suggesting that III/C and IV/F were produced in parallel with each other.

Obverse IIIb is also linked with E2, and so is IIIa (Bed. 455). Obverse IIIb is linked with J3 (Bed. 267) and J4, which, together with J5, are connected with E.

Reverse G3 occurs with obverse Ia. Particular interest attaches to this combination.
In Fig. 3 the various blocks of coinage and the links between them are represented diagrammatically. The size of the blocks is very roughly in proportion to the frequency with which the varieties occur. The coins with an extended obverse inscription, including the letters AMEN (for AMENAYN) found also on the double-trams, are presumably early, as Bedoukian observes (p. 80). So far as one can tell from his catalogue, they include varieties II/B (Bed. 141), II/H (Bed. 125), and II/J1. Two examples of II/H reading AMEN, from a nineteenth-century hoard, are illustrated on Pl. XI, 1-2. The AMEN varieties have been placed at the top of the diagram. Similarly, the progressive arrangement of Ia, b, c, and d downwards in the diagram is intended to suggest a chronological sequence, although this is not certain. Thereafter, the arrangement of the blocks is dictated merely by proximity and convenience — e.g. C and F ought no doubt to have been placed side by side if their position were to indicate their chronological relationship; and G2-3 should perhaps have been placed lower than C. From an inspection of the diagram, one can judge that the problematic areas are (i) the G1 / G2-3 link; and (ii) the overlap, if any, in the group I obverses, between D, E, and A.
Further research will no doubt succeed in pulling the diagram into a more exact shape, but it will obviously continue to present a very different pattern from the « normal » one of, say, eight varieties succeeding one another over a 20-year period, with scarce obv./rev. mules between varieties 1 and 2, 2 and 3, 3 and 4, and so on. In order to « elongate » the diagram chronologically, one would need to remove any link between G1 and G2-3, and this is impossible. G2-3 may be late in the sequence of II, but it is not very late; and G1 is doubtless early in the sequence of I. II/B and I/D,A may therefore be for the most part successive. Nevertheless there appears to be an overlap. Even apart from this consideration, one would be left with a complex clustering of parallel issues, some large and some small. The output of Levon's trams, viewed as a whole, is dominated by two main « officinae », or teams of workmen, II/B and I/D,A, which seem to have worked concurrently, although II doubtless began earlier, and I was responsible for the bulk of the output in the later stages. The coinage may have begun, for a year or so, on a quite small scale, but was then greatly expanded, and reached a maximum in I/A. The main issues were supplemented by others, which were certainly concurrent, and it is curious that they were so much smaller in scale, i.e. that one variety was being produced in small quantities at the same time and in the same mint that another was being produced in large quantities. The reasons may have been merely technical ones of organization within the mint, or they may have reflected the varying demand for coinage, or the varying availability of bullion, in some way. We have no clues to the absolute chronology of the issues. On a purely numismatic assessment, it looks as though almost all the coins could have been struck in the first seven or eight years of the reign, with the « late »-style, broader, untidy flans of I/A and II/B as the only subsequent issues. This makes the sudden accession of silver supplies to the Armenian kingdom all the more problematic. There is, however, no point in attempting to discuss the historical implications until some new hoards have provided us with independent ideas about the internal chronology of the series. Nor can one hope to make progress except within the framework of a detailed and critical numismatic study of the coins.
SURVEY, ARRANGED ACCORDING TO REVERSE VARIETIES

A1 and A2 (with Ic and Id). Within what is recognizably the same variety, these coins range between small, fairly neat dies (11) and unusually large, sketchy coins, often on flans with sharp, irregular edges, and often double-struck — i.e. carelessly manufactured (13). The dot at the base of the cross, which constitutes the formal difference between A1 and A2, appears to be without significance (cf. 11 and 16; 13 and 15). On all specimens note the small, simple upper cross, unlike that on variety G. The lions' heads are perhaps the most characteristic feature of variety A: they have high-domed foreheads, and prominent eyes and ears (11, 15, etc.), and look rather like bear-cubs. The associated obverses sometimes have a group of three dots in the field (12, and cf. 18). The king's crown is usually surmounted by three dots or three spikes.

A3 (with Ic or Id). Coterminal in style with A1/2, and the distinction between them is sometimes uncertain. 18 is from small, elaborate dies, with added groups of three dots. 17 is in the «late» style. 15 may in fact also be A3.

A4. The initial-star seems not to occur in variety A: all noted specimens of this formal design belong better with D — e.g. 10, which has been placed next to variety A to facilitate comparison.

B1 (with II). Elegant dies, well-struck flans, and stylistically a very compact group (6, 7, 8, and 9). Contrast the crown with the form found on variety A. There are a few «late» specimens (spread, untidy) which are of this variety, although many which are apparently so belong in fact to A, as may be determined from the general style of both the king and the lions (14, 15). See also 60.

B2. If coins identical in style with B1 occur, they are scarce. Nearly all specimens with a reverse formally of variety B2 clearly belong with A, being identical in style with A2. An exception has a crown imitating that of B, and on the obverse the «chains» of Ia-b: it may be from irregular dies (19).

B3. The specimens formally of this variety appear mostly to belong with A3 on grounds of general style, but a few «late» coins are genuinely II/B3.
B4. Most coins with an initial-star, such as 32, which might be identified as of variety B, are better assigned to D, but the variety II/B4 certainly exists.

C1-4 (with II, III, or IV). Apart from the characteristic obverse drapery, the whole execution of the III/C coins is distinctive. Note the king's boldly-dotted beard (23-25). The style of the lions shows that the dies were cut by a different hand from A or B: the mane is boldly dotted but the shoulder is plain; and between the shoulder and flank there are three lines (for the ribs). As regards the cross, it is in practice difficult to distinguish between the outlined (C1 and C3) and the solid (C2 and C4) forms. C1 and C2, i.e. with three dots at the base, are much more plentiful than C3 and C4. But C3-4 is not, so far as can be seen, associated particularly with either II, IIIa, or IIIb (IIIc is scarce); nor is there any obvious reason to place the II/C coins (21) early in the sequence of C. The drapery of type IIIa occurs with (22) or without (23) prominent pendilia of three dots, and both forms are combined freely with the reverse varieties. Notice the characteristic drapery over the knees in 24. The sketchy style of 25, with reversed lis and cross, is clearly related to 24. A mule links the reverse C1 or 2 to IVb (26) — the lions seem to be crowned. C1 also occurs with, apparently, IVa (Bed. 668).

D1 (normally with Ib). In D the upper cross consists of two large dots, with a smaller one above; and the upper arm of the main cross is usually thick. When it is thin, however, the variety looks very like A. D1 is much less plentiful than D2. The roughly-executed specimens may be late; the careful ones are almost certainly early, as they exhibit «experimental» features. On 27 note the lettering, the elaborate initial-cross on the reverse, and the clumsy lions' heads. On 28, also «early», note the «crowned» lions, and the mirror-reversal of the drapery over the knees.

D2 (with Ia, b, and c). The «chains» on the normally-associated obverse (29, 30, 31) are omitted on a simplified version, Ic (32, 33). If there is any overlap with A, it will be found here. The Ic dies associated with D appear, however, to be generally of a better quality. The lions are by the same hand as those of D1 (27, 28), and are inclined to be leaner than those of B — and easily distinguished from those of A. Cf. 10 (Ic/D2) with 9 (II/B1).

D3 and D4 (J6-7) (with Ia). The illustrated specimens (34, 35) share an obverse die, which has a different form of drapery over
the knees, but is obviously related to Ib. It presumably stands at the beginning of the sequence of I. The lions match those of D1-2; note that the king holds a dotted cross. D4 occurs with an initial-star, and also with the lions «crowned».

E1. An early version of E2? 36 is elaborate, perhaps experimental.

E2 (with Ib and c). The lions are obviously those of A, but the obverses (sometimes with a group of 3 dots as in A) usually correspond with the group Ib obverses associated with D. «Chains» are clearly to be seen on nos. 37 and 38. Plain obverses (Ic) also occur. E therefore seems to be in some sense intermediate between D and A. It is, further, linked with C by 40, which mules a late IIIb obverse with a reverse very similar to 38.

E3 (with Ib). The dies of 39 are of very careful and elaborate workmanship (note the crown), yet are clearly by the same hand as the common variety E2 (cf. the obv. of 37, rev. of 38).

F (with IV, and IIIb). F1 is experimental; and F2, with a complete cross, is perhaps earlier than F3, on which there is no seriffed lower limb. The intimate relationship of these and of the corresponding obverse designs is sufficiently demonstrated by the pattern of die-links of the illustrated specimens, which include a IIIb/F2 mule (Fig. 4). F4 occurs with IVb. Note that IVc (45), like IIIc (25), has the lis and cross reversed. It is tempting to see a parallel here between III and IV; but the lions of F are not by the same hand as those of C, as there is no plain shoulder between the mane and the ribs.

G1 (with 1a). The distinctive variety with a «patriarchal» cross (46, 47) often, as here, has dots added in the angles (J9). The associated obverses, with 1a drapery (46), are very similar to 1a/D3-4 (34-5), and probably stand close to them.

G2 and G3 (with II). 51 and 52 are typical of coins with variety II obverses and G2 or G3 reverses. The style of the earlier II obverses, such as is found with reverses H and J1, is also represented (49, which might, however, be classified as H); if coins such
as this are genuinely G2, they raise problems of chronology, since they imply, at the least, that the issue of G2 began early, — and, as we have seen, the G1-G2 link and the relationship of II/B to I/D make it preferable to place G2-3 late in the main sequence of II/B. The lions of G2-3 are very much as on B.

Links between G1 and G2-3. Whether there is continuity of output between G1 and G2 is problematic, but links certainly exist. 48 is a very clear example of Ia/G3. The obverse of 50 is related to the idiosyncratic Bedoukian 572 (20) but its reverse, with a bold upper bar to the cross, is unlike A, and seems closely similar to 52 (II/G2). It seems, therefore, to be another link between I and II.

H (with II). Small, densely-engraved dies, which include the « AMEN » variety, and are doubtless early (1, 2, 3, and perhaps 49).

J1 (with II). Similar to H, with 2 dots added below the cross (4, 5, 53).

J2 (with I). Reverses related to A, with 4 dots added (54, 55). Compare 54 with 14 and 15.

J3 and J4 (with IIIb or IVb). These seem to repeat the III/IV parallelism, and also the option of three dots at the base of the cross as in E1-2. The lions are apparently by the same hand as those of E (56, 57, 58).

J5 (with Ib). The cross has a dot at the centre. This is probably a variant of E (59).

PROPORTIONS IN WHICH THE VARIETIES OCCUR

The « white » and « blue » parcels, summarized below, show essentially the same pattern of common and scarce varieties, with II/B-G accounting for about 25%, I/D about 10%, C and F about 10%, and I/A about 40%. In the Mersin hoard similarly, it seems that variety D2 amounts to 6.8%, F to 1.0%, and J1-5 together to about 5%. When some new hoards have been studied, it should be possible to see whether all the main varieties are already represented in the « white » and « blue » parcels (as seems likely), and whether the same proportions are general in hoards deposited at the end of Levon's reign. One hopes, of course, that chance will yield a hoard that was concealed part-way through the issue of the coinage — say, with no specimens of I/A.
The dominant characteristics of the metrology of Levon's trams are, first, that the flans are quite accurately adjusted, a clear majority of specimens falling between 2.8 g. and 3.0 g., and secondly, that the «late» coins, i.e. those on broader, untidy flans, show a somewhat wider range on either side of the average.

The integrity of the parcels that have been studied is hardly such as to justify any very elaborate metrological analysis. The coins were sorted into «white» and «blue» parcels by eye, and, if there were originally two hoards, some coins from the «blue» hoard which had been cleaned satisfactorily are likely to have been counted as «white». What follows is therefore only a preliminary testing of the evidence, designed to draw attention to problems that will be better studied when a new hoard comes to light. For the moment, there are three questions. First, are the «white» and «blue» coins from different hoards? Secondly, what was the original intended average weight of the trams? Thirdly, are there

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<td>F</td>
<td>1.1</td>
<td>2.8</td>
</tr>
<tr>
<td>E</td>
<td>1.5</td>
<td>3.2</td>
</tr>
<tr>
<td>J3-5</td>
<td>0.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Bed. 572</td>
<td>0.8</td>
<td>-</td>
</tr>
<tr>
<td>Uncertain</td>
<td>0.4</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
any metrological differences between the varieties, and can they contribute anything to the classification?

First, the «blue» coins are a little lighter than the «white». This is consistently so for each of the main varieties. The difference is of the order of 0.02 g., or less than 1.0%. Such a difference might indicate that the «blue» hoard was buried four or five years later than the «white» hoard, when the coins had suffered a greater loss of weight by wear (at, say, 2% per decade), or it might merely reflect heavier leaching of the «blue» coins while they lay hidden in the soil. What it cannot reflect is the effects of cleaning, since the white coins have been more heavily cleaned than the blue, and, in a comparable condition, are likely to have been, say, 2% heavier rather than 1%.

The difference between the two parcels can be seen both in the mean averages for the main varieties, and also in the lower modal values of the «blue» hoard. The examples set out below illustrate a practical problem which arises in the construction of histograms. A standard step-interval (0.1 g.) tends to obscure the modal point, and it can also create a totally artificial appearance of skewness. The cure is to stagger the step-interval, trying 2.80-2.90, 2.81-2.91, 2.82-2.92, and so on, in order to maximize the percentage of specimens falling in the central step of the histogram. The midpoint of the central step thus determined is the best practical measure of the mode. So many of Levon’s trams lie between 2.8 and 3.0 g. that some such procedure is needed. Even with a standard step-interval, one can judge that a small difference in the mean weight is matched by an appreciable downward shift in the modal value:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Mean</th>
<th>Under 2.50</th>
<th>2.50-2.60</th>
<th>2.60-2.70</th>
<th>2.70-2.80</th>
<th>2.80-2.90</th>
<th>2.90-3.00</th>
<th>3.00-3.10</th>
<th>3.10-3.20</th>
<th>Over 3.20</th>
</tr>
</thead>
<tbody>
<tr>
<td>II/B «White»</td>
<td>2.92</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>23</td>
<td>53</td>
<td>12</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>«Blue»</td>
<td>2.89</td>
<td>1</td>
<td>-</td>
<td>6</td>
<td>49</td>
<td>37</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>C «White»</td>
<td>2.91</td>
<td>-</td>
<td>2</td>
<td>10</td>
<td>37</td>
<td>32</td>
<td>17</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>«Blue»</td>
<td>2.86</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>15</td>
<td>44</td>
<td>32</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>I/A1-2 «White»</td>
<td>2.91</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>32</td>
<td>39</td>
<td>14</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>«Blue»</td>
<td>2.89</td>
<td>1</td>
<td>4</td>
<td>14</td>
<td>34</td>
<td>33</td>
<td>11</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>I/D «White»</td>
<td>2.91</td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>25</td>
<td>49</td>
<td>13</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>«Blue»</td>
<td>2.89</td>
<td>-</td>
<td>4</td>
<td>4</td>
<td>29</td>
<td>42</td>
<td>21</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
The results are consistent enough for one to conclude that the « white » and « blue » coins reflect two separate hoards. The distribution is rather more compact for the « blue » coins, and this is no doubt because the « white » total conflates some « blue » coins. Combining evidence from different hoards will, of course, lead only to confusion, — giving misleading means and spread distribution-curves.

Secondly, the same internal consistency between different varieties allows one to conclude that the original intended average weight of the trams was close to a figure of 2.91 g. plus whatever the coins in the « white » hoard had lost by wear and cleaning — perhaps another 1 or 2%.

Thirdly, the only obvious metrological difference that has been noticed among the varieties is that G2, on limited evidence, is lighter than any of the other common varieties. Why this should be so is at present quite inexplicable. The « later » coins include a few more specimens which deviate widely from the mean. They seem also to be marginally lighter — but are well up to standard in comparison with G2.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Mean</th>
<th>Under 2.50</th>
<th>2.60-</th>
<th>2.70-</th>
<th>2.80-</th>
<th>2.90-</th>
<th>3.00-</th>
<th>3.10-</th>
<th>Over</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>2.50</td>
<td>2.60</td>
<td>2.70</td>
<td>2.80</td>
<td>2.90</td>
<td>3.00</td>
<td>3.10</td>
<td>3.20</td>
</tr>
<tr>
<td>II/G2 «White»</td>
<td>2.86</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>20</td>
<td>33</td>
<td>40</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>«Blue »</td>
<td>2.85</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>17</td>
<td>50</td>
<td>22</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>I &amp; II, «late»,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>«White »</td>
<td>2.90</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>3</td>
<td>29</td>
<td>38</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

The flans for variety I/D were produced more carefully than those for I/A, as is shown by the taller central step, and this is consonant with their being earlier.

_Oxford_
### Key to Plates XI-XIII

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1.</td>
<td>II/H « AMEN »</td>
<td>21.</td>
<td>II/C</td>
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<td>IVa/F1</td>
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<td>IIIa/C</td>
<td>42.</td>
<td>IVb/F2</td>
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<td>IIIa/C</td>
<td>43.</td>
<td>IIIb/F2</td>
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<tr>
<td>4.</td>
<td>II/J1</td>
<td>24.</td>
<td>IIIb/C</td>
<td>44.</td>
<td>IVb/F3</td>
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<tr>
<td>5.</td>
<td>II/J1</td>
<td>25.</td>
<td>IIIc/C</td>
<td>45.</td>
<td>IVc/F3</td>
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<td>26.</td>
<td>IVb/C</td>
<td>46.</td>
<td>I/G1</td>
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<tr>
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<td>II/B</td>
<td>27.</td>
<td>I/D1</td>
<td>47.</td>
<td>I/G1</td>
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<tr>
<td>8.</td>
<td>II/B</td>
<td>28.</td>
<td>I/D1</td>
<td>48.</td>
<td>Ia/G3 mule</td>
<td></td>
<td></td>
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<tr>
<td>9.</td>
<td>II/B</td>
<td>29.</td>
<td>I/D2</td>
<td>49.</td>
<td>II/G2 or H?</td>
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<tr>
<td>10.</td>
<td>I/D2</td>
<td>30.</td>
<td>I/D2</td>
<td>50.</td>
<td>I/G2 mule?</td>
<td></td>
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<tr>
<td>12.</td>
<td>I/A1</td>
<td>32.</td>
<td>I/D2</td>
<td>52.</td>
<td>II/G2</td>
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<td>13.</td>
<td>I/A1</td>
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<td>I/E1</td>
<td>56.</td>
<td>IIIb/J3</td>
<td></td>
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<td>I/A3</td>
<td>37.</td>
<td>I/E2</td>
<td>57.</td>
<td>IIIb/J4</td>
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<td>18.</td>
<td>I/A3</td>
<td>38.</td>
<td>I/E2</td>
<td>58.</td>
<td>IVb/J4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TRAMS DE LEVON Ière (Arménie cilicienne)
Trams de Levon 1er (Arménie cilicienne)