THE CLEROTERIUM

This is a memorial token to Mary Isobel Henderson who was Visiting Professor at Wheaton College, Massachusetts, 1964–65. STTL.

THE examination of the cleroterium by Sterling Dow left few questions connected with it untouched. His publications on this ingenious device are as follows: 'Allotment Machines', *Prytaneis: A Study of the Inscriptions Honoring the Athenian Councillors*, *Hesperia*, Suppl. i (1937) 198–215, with photographs (hereafter referred to as P); 'Aristotle, the Kleroteria, and the Courts', *HSCP* l (1939) 1–34 (hereafter referred to as H); 'Kleroterion', in PW, Suppl. vii (1940), col. 322–328 (hereafter referred to as PW). G. Klaffenbach summarised Dow's analysis in 'Antike Losungsapparate', *Die Antike* xiv (1938) 353–355. Prior to Dow, notice of one fragment of a cleroterium was published by B. Tamaro, 'Pianta Epigrafica dell' Acropoli', *ASAA* iv/v (1921–22) 63 nr. 124. P has clear photographs of all remains then known. There are drawings in PW based on the drawing of I and photographs of I, II, III, X, and XI in P—Dow labelled the remains with roman numerals; I follow his labelling. Drawings in P are found opposite the photographs of I and of VI; in H, as frontispiece. Since Dow's publications appeared, there has been no reconsideration of his work nor any re-examination of his reconstruction. This is proof of the quality of his work.

In 1960 when I first studied Dow's reconstruction, I relied on the excellent and revealing photographs in P. My own mechanical aptitude made me feel uneasy over certain small details in the reconstruction. But I was unable to examine any of the remains until in 1966 when returning from Turkey I stopped briefly in Athens, observed the cleroterium on display in the Agora Museum, but found the Epigraphical Museum closed. Mrs Bishop (Doris Taylor Bishop) however was able to visit the Museum after I had returned home; she was courteously given the opportunity to take a few measurements of no. 8984 (= *IG* ii² 2864a) which is Dow's machine I. Since the device on display in the Agora Museum is Dow's X, I was able to observe that one fairly closely myself. Two things interest me here: (1) the structure of the cleroterium and its mode of operation; (2) the reasons for the structure and operation and the light they shed on certain aspects of the Athenian political process. I will not examine those aspects in detail, but will concentrate on the mechanics of the cleroterium. This handful of notes, then, is offered as additions, amplifications, and alternatives to some small parts of Dow's discussions. And lastly, in order to ease the burden of explanation, I will assume that a copy of P is at hand, open at the photographs of the stones; thus the eye can verify the trend of the arguments.

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In the photograph of I there are two 'nail' holes bracketing the lower cleat cutting which seem to be connected with the mechanism for releasing the lots from the tube. The mechanism imagined by Dow (P 199) is a crank which operated a cup inside the tube. When the crank handle was turned down, the concave surface of the cup supported the column of lots. As the crank was operated, the cup rotated up and over the bottom lot which then dropped out of the tube. The convex surface of the cup now supported the remainder of the column. As the crank and cup were rotated to their original position, the column of lots dropped down so that the next lot to be released now rested in the concave surface of the cup. The weight of the column of lots caused a certain strain on this release mechanism, particularly when they first fell down the tube; the mechanism therefore would require support from the wall of the tube; but no tube survives to show how this problem was handled.

So far the two nail holes bracketing the cleat cutting are not accounted for; and this is the first difficulty with the theory of the cup release: it does not account for the remains on the stone. A second difficulty is that installation of the cup would be far from simple; indeed the device is quite sophisticated and perhaps even beyond the ability of a Greek metal-worker. A third difficulty is that the cup release seems to impede rather than to expedite the overall process. The drawing in P 201 shows the crank handle exactly parallel to the face of the stone and extending towards the column of slots; so also the drawing in PW. But this position requires right-hand operation, if not also a right-handed operator, for the handle in this position can be grasped and operated by the left hand only with great difficulty; further, the operator, whether right- or left-handed, is compelled to stand in front of the face of the device. His body then conceals what he is doing. There is danger that he will accidentally jostle the device. There is also opportunity deliberately to tamper with the pinacia or with the release mechanism. The manual difficulty apparently caused Dow in H to draw the handle at a 45° angle from the face; this position eases somewhat the very tight fit for the knuckles when one turns the crank handle, and it tends to reduce the opportunity to disturb the pinacia; it may also slightly reduce the necessity to screen the proceedings from view. But the main difficulties still remain: not only can the operator wittingly or unwittingly jostle the machine but his body conceals what he is doing and thus provides opportunity and encouragement to tamper with every element of the process. One certainly would expect the face of the device to be recessed in order to hinder casual or intentional disarrangement of the pinacia; the remains indeed show the requisite pilasters and cornices. Further, the operator should stand to one side so as to permit the bystanders (i.e. the allottees) to see clearly every step in the procedure. In the light of these objections, even though the cup release is a neat solution, we regretfully lay it aside, at least for I. In its place I suggest the following.

The nail holes in I are not features designed for support, but are merely places to insert projections. The release device consisted of two spikes or spits or nails or wooden pegs running transversely through the tube; I am indebted to Anna Benjamin for the suggestion of wooden pegs. The operation is simple. The upper spit supported the column of lots. When it was withdrawn, the column dropped down on the lower spit. When the upper spit was re-inserted, it was pushed between the two bottom lots, thus separating the bottom lot from the rest of the column. Then the lower spit was withdrawn, and the ball dropped out to complete the allotment. Since obviously the tube fitted tight against the marble—else why carve the channel so carefully?—the tang of each spit had as support only the thickness of the wall of the bronze tube (to guess: 2–3 mm? 5 mm?). It is obvious that the tangs would readily slip out of place and thus cause a misallotment whenever the device was jarred, or even touched. Hence behind the thin bronze wall of the tube one would expect to find two recesses in the marble into which the tangs fit when inserted in the tube. These recesses are the nail holes in I which bracket the lower cleat cutting.

K. von Fritz and E. Kapp in *Aristotle's Constitution of Athens and Related Texts* (New York, 1950) 198, have clearly described Dow's reconstruction but seem not to understand the mechanical operation of his release. The cup must be rotated within the tube; but von Fritz and Kapp say that 'the tube is closed by a handle, which, when drawn, will let fall out one cube at a time'. This inaccurate description is clearly on the right track; but it also reveals how much there is a need for mechanical aptitude in order to understand the existing remains.

The cornice of I is preserved, including the cone through which the lots entered the tube. The diameter of the hole at the bottom of the cone controls the approximate size of the lots used in I; their shape was spherical, for cubes jam too readily. The tube can be fitted to the bottom of the cone in two ways. Either the tube was fitted against the opening; or it was inserted part way into the bottom of the cone. The fact that there are

two cleat cuttings argues that the tube was not inserted in the neck of the cone. For if the tube was wedged into the cone, then when the lower cleat was leaded in place, the tube was securely held at both ends; the upper cleat cutting then was not needed at all. But if the tube was only fitted against the opening in the cornice, then two cleats were needed to hold the tube steady. Further, there is great difficulty in manœuvring both the lip of the tube and the upper cleat into their apertures. The tube then was not built into the stone but was attached to it; aside from any leading, it could be easily removed. As for visual security, even though the fit between bronze and marble might be loose enough so that one could see that the balls were falling into the tube, nevertheless they would tumble down so fast that the sequence of the balls would be secure.

According to Dow, the diameter of the narrow end of the cone in I is 0·025 m; in II, which also preserves its cone, the diameter is 0·032. Since these are critical measurements for the lots which must pass through these apertures, the difference—*c.* 1 in. versus *c.* 1¼ in.—apparently indicates a difference in the size of lots, a fact which reduces the possibility of interpolating an illegal non-uniform lot. How does the diameter in I compare with the distance between the two nail holes? The agreement should be quite close, for both are critical measurements. Mrs Bishop's measurements are 0·035 centre-to-centre for the distance between the nail holes in I and 0·04 outside-to-outside, which comes to 0·03 inside-to-inside; the nail holes apparently then have a diameter of 0·01 at the surface of the stone. The balls were smaller than the cone's diameter, that is, smaller than 0·025, to ensure passage through; one might guess that the diameter of the balls was 0·023, thus leaving 0·007 extra space out of the 0·03 between the two nail holes. Since this remainder is less than one-third the diameter of the balls, it would not be hard to re-insert the upper spit even though the alignment seems not ideally precise.

As for the spits, their size is indicated by the effective interior diameter of the nail holes which Mrs Bishop measured as 0·005. The spit then had a blunt point, like that of an ordinary lead pencil. Whether the shank of the spit inside the tube was thicker or the same diameter we cannot know; but for our calculations there is no difference, since the support which the spit gains from the recess in the marble can take no advantage of any thickening of the shank; the spit would be no stronger than its weakest crucial diameter. Therefore essentially the spit was slightly larger in diameter than an ordinary lead pencil; one could easily believe that wooden spits could withstand the wear and tear of operation in I. The length of the spits can be estimated. Mrs Bishop measured the depth of the nail holes as *c.* 0·015; that plus the assumed diameter of the tube (0·025) plus a minimum of 0·02 for a handle yields a minimum length of 0·06 for the spits. Installation of the spits was accomplished merely by punching or molding the appropriate holes in the tube and then inserting the spits.

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Dow's X has slight cuttings below the lower cleat hole which also support my hypothesis, although the original supposition (P 208) was that they were anchorings for a receptacle to catch the lots as they dropped out of the tube. I have no exact measurements for the cuttings in X since it had to be observed through its glass case. The photograph in P can readily be compared with that (fig. 23) in Picture Book No. 4 *The Athenian Citizen* of the American School of Classical Studies at Athens. In neither photograph does it appear that these cuttings are deep enough to provide support for a receptacle; this agrees with my direct observation of X. While the strain caused by the lot's dropping 2 or 3 cm. into a receptacle would be negligible, nevertheless the continual wrenching and pushing and twisting caused by the operator as he tried to retrieve a lot is hardly inconsiderable. If a deep cleat hole was necessary to support the tube as the lots were being poured in,

certainly equally deep cuttings were needed to brace a receptacle against the rough-and-ready probing and grasping of the operator's hand. Hence these cuttings are more readily explained as recesses into which the spits of the release device could extend, just as in I. The larger cleroteria then did use the same kind of tube and release as the smaller.

The question of a receptacle however is a sound one. For what did happen to the lots as they dropped out of the tube? If they landed one by one in the operator's hand, he certainly had an opportunity to substitute an illegal lot. The visibility of the lot is a prime consideration right up until the pinacia have been disposed of according to the directions of the lot. Thereafter the lot is a historical record of what happened; but for how long a time is it necessary to have a record that the first group was rejected but the second and third accepted, etc? If until the allotment has been completed and all candidates have had their turn, then some sort of receptacle seems indicated, something with a display gallery to contain all the used lots in their order, something which the operator would not touch until his duties were fulfilled. But the remains give us no clue, except that so far as X is concerned such a receptacle was either a separate and movable item or something carved into the base on which it is assumed that X stood.

Dow's X has at present a tongue, in width apparently two-thirds that of the original stone, which Dow took as proof that this stone was let into a mortise cut in a base block (P 208); hence for exhibition it is now mounted in this way in the Agora Museum. The stone seems to have had pilasters which were later trimmed off. Stones I and II show pilasters; it was obvious above that not only were they decorative but also they were quite useful in that they provided protection for the pinacia in their slots and for the tube. The rough cutting on X shows that it too had pilasters; perhaps when they were trimmed off, the bottom was notched so as to create the tongue. The resulting shape is certainly suited to its secondary use as a threshold; in that case, presumably a door post stood on the tongue and gained solidity thereby. It seems reasonable therefore to assume that perhaps the stone originally rested on a base but not in a slot. It is true that the cutting to form the tongue is far from being recent; but how much later could the cutting be than the primary use of the stone and still now seem to be original? Dow's description (P 208 n. 1) says: 'It had been re-used to form the bottom of a pit in Turkish times. . . . The back, having been used as a threshold, is so footworn that its original condition cannot be established.' Which was the earlier? Pit lining or threshold? Would subsequent exposure weather the notches sufficiently to disguise a lesser age? The exact configuration of the wear on the back of X may help settle this point very quickly.

In any case there is enough clearance for the spit mechanism. The photograph of X mounted in a base, fig. 23 in the Picture Book cited above, shows that the distance between the two holes is less than that from the lower hole to the modern base. My best estimate through the glass case in 1966 was that the holes were 0·025 apart, inside edge to inside edge, and that the lower edge of the lower hole was 0·03 from the modern base. If the ratios established for I hold here for X, then the tube had a diameter of 0·021 and the ball 0·018; thus apparently we have a third size of ball: I = 0·023, II = 0·03, X = 0·018. The ball in the display case next to X was identified as a cleroterium lot; I estimated its diameter at 0·015, but without being able to boast of much accuracy, for the glass case prevented anything beyond a reasonable estimate; nevertheless this gives us perhaps a fourth size of allotment ball; certainly this is enough to show that each assembly was complete in itself, that the lots could not be used for any purpose other than their own allotment. But to return to X, a lot 0·018 in diameter would certainly be able to pass easily out of the tube in the 0·03 clearance which I estimated to be available in the present installation of X, even allowing for a cuff on the tube below the lower spit. But further, we have no way of knowing whether or not the base was trimmed to allow freer escape or to provide a gallery for the display of spent lots as a temporary historical record. The

prime consideration however is not the looseness of tolerances but the protection against illegal prestidigitation: one would think that the lot should be identifiable by any watcher before the operator could pick it up or conceal it, perhaps even before he himself could identify it. See φυλάσσειν below, p. 10.

The spits for X seem to have been sturdier than for I. My best estimate for the upper cutting in X which would have received the tang of the spit was 0·015 square; and for the lower hole, 0·012 square. The diameter of the spits for I seems to have been *c.* 0·01. The additional sturdiness of the spits for X seems reasonable since the dead weight of the greater number of balls in this machine would require a sturdier stop; perhaps also we have here an even clearer case for wooden spits than in I. The holes in X seem to show square spits; or is the shape the accidental result of the cutter's use of a chisel instead of a point? What value the squareness would have for the spits I do not know.

The photograph of the nail holes—those holes which received the tangs of the spits—in both I and X show that the spits projected straight out from the face of the device. The operator would naturally stand only in front of the tube and therefore away from the face of the stone. He could easily stand completely to one side while operating the spits with either hand, whether the lots fell into a receptacle or were caught by the operator's hand. With only his hands and arms in front of the tube, every motion he made would be exposed. It would be very difficult to palm off a spurious lot or juggle the pinacia.

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If one compares the photographs in P of I and II, it seems obvious that II has been remodelled. The evidence for recutting is as follows. First, there is the channel for the tube. In I, it is rounded and smooth; in II, rough and cut square, although the opening from the cone is round and the rest of the stone is carefully finished. The measurements of the squared channel have not been given in P, nor its relation to the round hole; this limits the deductions one can make about the recutting. Second, there are two cleat holes located both in approximately the same relation to the hole in the cone. Third, the right column of slots is cut differently from the left column. The slots on the right are larger in their visible dimensions: top to bottom, and side to side; they are not lined off with those in the left column; and they seem from the photograph to be less neatly cut, though the chipping in the left hand slots disguises their neatness. The general impression is that the second workman was less skilled or at least worked under a handicap, the channel being not so much squared as roughly hacked out and the pinacia slots on the right more carelessly cut. Perhaps he had to work around a tube already installed, though how he could do so and why it was necessary to cut away the channel between tube and pilaster are questions not yet answered. On the analogy of I, it must be assumed that the left column is the original, the right the later addition; the lower cleat hole the original, the upper the later. The differences in cutting bear this out. The second cleat ought to indicate a different variety of tube: since there is no accommodation for a tube in the cornice, the tube therefore did not fit in the ordinary way. Presumably the first tube remained the same and stayed *in situ*, fitted to the cone. But the second tube must have stuck out in front of the cornice, for the second cleat hole is cut too close to the first to allow a second cone to be cut in the cornice; hence it had its own bronze cone, a long upper cleat; and perhaps it had a normal cleat which then pulled the bottom end of the tube in close to the face of the stone near the end of the first tube and thus permitted the lots to drop out in the same way as in the original tube. The two tubes therefore made a sort of Vee.

Since the recut stone is suitable for *synclerosis* (P 213), presumably it belonged to that part of the dicastic process before being recut, i.e. it was used to assign archons to courts (for the moment, in order to sharpen our analysis of the stone we will assume that II

belonged to the dicastic process), for *synclerosis* is merely a step to add an extra measure of random distribution to existing proceedings; and further, one would not expect a machine acquired for another purpose to be commandeered for conversion to dicastic *synclerosis*. We should assume then that II in its original state was used for the forerunner of the dicastic *synclerosis* described by Arist. *Ath* 66.1. At that earlier stage there must have been some way to assign archons particular courtrooms. But before one can reconstruct the earlier process, one must find out why the stone cutter trimmed stone which was not in the way. The device certainly had worked before being recut. When the process was changed, why was the tube's channel squared? It cannot be because the tube was converted to accommodate cubes, for even though the squaring of the channel in II dovetails with Aristotle's calling the lots cubes (P 213 n. 3), nevertheless the round hole in the cone is decisively against using cubes in this device. But if by chance the Athenians did manage to get square cubes through a round hole, one would suppose from the photograph (P 204) that a tube fitted to the squared channel would accommodate cubes nearly twice as large as could be dropped through the hole in the cone; or, if the cone controls the size of the cubes, the cubes would slip together inside such an excessively large tube; the resulting jam would cause the immediate discard of such an ill-proportioned tube. Hence neither the diameter nor the shape of the tube could be the reason for squaring the channel. Why then was it squared? The squaring may have been designed to cut away stone which carried marks no longer usable, indeed distracting and illegal; that is, the second tube and its column of slots replaced a step in the procedure using something on the stone which then had to be cut away; a reasonable guess, but so far the only clue is the removal of some stone in a way not needed to 'de-bug' a malfunctioning tube.

Throughout the Aristotelean account of the dicastic process tokens of one kind or another expedite the process and identify those connected with the steps in the process. Thus the successful dicast proceeded to his courtroom with a balanus and a bacteria which admitted him to the proper courtroom; the proof that he had the proper balanus and bacteria came from his pinacium which arrived in a chest by a different route. The colour of the bacteria corresponded with the colour of the room, as everyone could see; and the attendant could verify the letter on the balanus. But what identified the archon as he strode to his courtroom? In Arist. *Ath* 66.1 the cleroteria allotted archon and courtroom, one pairing at a time; the herald announced the allotments. Thus everyone within earshot—all the dicasts?—knew each pair as each was completed. Would not that be enough identification? Or did the archon also have a token?

I propose that the excised stone contained holes into which the court designations were inserted. There was one tube and one column of slots which received the pinacia of the archons as they were sent off to their courtrooms. What then was the special value of those designator holes? If it was necessary only to show the normal order of the courtrooms, the pinacia slots did that; for the first slot represented assignment to the first room of whichever archon was first allotted; no need then for 'room-order' slots between the pilaster and the tube. If it was necessary to create an artificial order of courtrooms to be paired with an artificial order of archons, then two side-by-side columns of slots are a much more efficient method of pairing; it is also a more natural concept than to put half of the critical pairing out in the margin, separated from its mate by the tube, and completely off the central display area of the stone; indeed when the stone was recut specifically for parallel allotments, the second column of slots was then cut, an excellent indication that the original stone did not contain a double allotment. It seems obvious then that one must assume that the holes between the pilaster and the tube did not contribute to the allotment of the archons; they must instead have held a set of symbols used for another purpose; if not room designators, what then?

There seem to be three possibilities: (1) the pinacia of the allottees were temporarily

stored in those holes until the allotment moved each pinacium into its proper place on the face of the stone; (2) the holes contained symbols such as room designators which were then given to each archon as he was allotted, surrendered his pinacium to its slot on the face, and went to his assignment, using the room designator as proof that he was entering the proper courtroom; (3) another set of symbols was stored in these holes for a purpose we know nothing of as yet. At present the obvious choice is the first alternative, since it keeps the allottee away from the stone. But the second alternative is attractive, for the symbol would prove the archon's office just as the balanus and the bacteria proved that of each dicast.

The original stone provided only one random selection, for there was only one tube and one column of slots; the allotment then provided the officials for a fixed order of courtrooms—the first slot representing the first courtroom, etc. The reverse might be assumed: that the courtrooms were allotted to a fixed order of archons; but elsewhere in the dicastic process the man is assigned to a function or a place, not vice versa. Arist. *Ath* 66.1 does state that in his *synclerosis* the allotment of the officer came first, then of his courtroom. Since political processes tend to be conservatively maintained and to undergo only unavoidable change, one should see here evidence that the random allotment of the rooms was added to an existing allotment of officers. That is, Aristotle's text strongly implies that the original form of II allotted a random order of officials to a fixed order of rooms, and that when *synclerosis* was developed (i.e. when II was recut) the basic and primary allotment was that of the officials, to which was added that of the courtrooms. Hence one deduces that the second allotment, which provided a random order of rooms, replaced a fixed order which used symbols set in holes carved between the pilaster and the tube. The change in the process caused the excision of the unneeded holes. Thus the second alternative above seems to be the correct one: room designators which the archons used to prove their right to conduct their assigned courtrooms. In the revised system, under *synclerosis*, the allotment did not provide an archon with a room designator. How then could an archon prove his right to his courtroom?

In the allotment of dicasts each ball controlled one row of pinacia (*cf.* X). After each ball appeared, that particular row of pinacia was cleared off the face of the stone: the black-balled pinacia were handed back to their owners, but the white-balled allottees were sent on to their courtrooms along with a lettered balanus and a coloured bacteria each to prove their right to a seat in a particular courtroom, while a few minutes later their pinacia arrived in a box; the balanus and bacteria announced the relation of room and dicast, and the box of pinacia proved it, if need be. For the archons, the public announcement of archon and room was made by a herald: his stentorian cry notified all courtrooms which archon was to go to which room. At this point we have an archon in each room, justified in his being there by the fact that the dicasts remembered the herald's announcement. If challenged, the dicast could prove his right to his balanus and bacteria by calling for his pinacium: it was in the proper box in his courtroom. But what proved the archon's right? The fact that in the first courtroom II (or a machine like it) stood with its columns of archons and rooms; the dicasts in that room stood guard over the legality of the process while the archons and the rooms were paired; the two sets of pinacia (of the archon and of the room) then stayed on permanent display under the eyes of those first-room dicasts until the court proceedings were over. But what deterrent existed over the possibility of collusion between archons? Perhaps only the fact that certainly the dicasts in the first courtroom, and probably those in all the others, knew from the announcement by the herald which archon was supposed to go where and could watch him walk by himself and enter it: judiciously expedited delay would prevent the archons from meeting en route and swapping assignments. This small part of the process may be helpful in reconstructing the court complex.

Synclerosis is quite possible on II without danger of connivance between allotters, which

Dow supposed to be the reason for using two cleroteria in the assignment of archons to the courts. One tube had the lots for the archons; one official drew these lots and posted the results, one by one, standing off to one side as he did so (*cf.* p. 2 above). The other tube had the duties; the same or another official drew these lots and posted the results correspondingly. As soon as the first allotment had been posted in each case, it made little difference who drew the other lots, for malpractice would be exposed. Hence the need to expedite the preliminaries—and to provide duties for officials?—controlled the assignment of the second operator to the second tube. The fact that Aristotle tells us of two cleroteria being carried into the first courtroom for the assignment of the presiding officials then becomes evidence not so much for the portability of the cleroteria and the honesty of the operators, as for the fact that the cleroteria and the canonides are two separable parts of the device, indeed originally being completely distinct. That is, Aristotle tells us that tubes, and tubes only, were carried into that first courtroom; *cf.* K. von Fritz and E. Kapp, *Aristotle's Constitution of Athens and Related Texts* (New York, 1950) 143 n.a, who note that 'they seem to have consisted merely of two tubes of the same kind as those affixed to the allotment machines.' . . . Again they seem to have misunderstood Dow; but again they are closer to the truth. Dow (P 213) thinks in terms of a wooden model of II. Marble weighs well over 167 lbs per cu. ft., by no means an impossible load for Athenian musculature; but the weight factor induced Dow to conclude that lighter wooden models were used for the dicastic *synclerosis* of the archons. But if tubes, and only tubes, were used, the archon selected by the first tube could go to the second tube, receive his court assignment, and proceed to it; meanwhile the second selectee did likewise. But in case of a dispute, how did an Aristotelean archon prove his right to his courtroom?

Aristotle clearly says that three persons were involved in the dicastic synclerosis: one thesmothete for each tube and a herald to announce the results. The two tubes on II were set so close together that each thesmothete in turn had to step out of the way to allow the other to operate his tube. The clumsiness of operation seems unavoidable. Yet the very fact that the operators had to move out of the way could be considered to contribute to the security of the situation: there would be greater emphasis on keeping all aspects of the allotment open to the dicasts' view. Nevertheless the neatness of design—two tubes beside two files of slots with paired ranks—is not matched by a corresponding smoothness of operation. It is obvious then that the recut stone required a single operator as it had in its original state; it is all the more probable then that the two operators cited by Aristotle were not required for security but for speed and smoothness of operation. Thus we have additional grounds for assuming that II comes from the stage when *synclerosis* was being introduced, the original grounds being the fact of recutting. Aristotle's account (*Ath* 66.1) states that the tubes and operators were separated from each other. The type of II then was improved by separating the tubes at the time when a second operator was supplied. One would guess that the usefulness of the paired slots would dictate a stone with a tube and operator on each side, the paired columns being in the field between them. At this point II was abandoned. The chronological hint seems strong and should be followed up; one hopes that modern technology has techniques to help establish relevant data to support a chronology.

At the beginning of the discussion of II (see pp. 6–7 above) it was assumed that the stone belonged to dicastic *synclerosis*. But it may have belonged to another public process. In that case the discussion concerned with the dicastic process would be no longer valid; but the discussion concerned with the stone would still stand and would control the reconstruction of the other process. Or it may be that every public *synclerosis* used the dicastic machine; then all the interested parties would gather in the first courtroom where the stone was set permanently in place (see pp. 13–14 below).

All this reconstruction seems logical enough and in accord with both Athenian

temperament and the other parts of the dicastic process; but evidence for it is the fact that a certain amount of stone was cut away from a place where its excision did not help the mechanical operation of the adjacent tube, presumably at the time of the other recutting. All the rest consists of deductions, guesses, and reasoning.

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The shape of the tube, as Dow noted, implies spherical lots which however are called cubes by Aristotle, a term denoting squareness. Dow, who prefers spheres but is distressed by the term cubes and the squared channel of II, thinks (H 14) that because the lots were cubes they tended to jam in the tube. Obviously a line drawn diagonally through the cube measures the critical dimension. The Greeks certainly knew that if a cube was to tumble freely through a tube, the diameter of the tube must be greater than the diagonal of the largest cube, or a cube would jam the tube by becoming tilted in it; the probability of jamming is greatly increased by the nature of the bronze tube itself: the casting or mill work would not have left a smooth, frictionless surface. The only other way to jam a tube is to use odd shaped pieces which will slide together in such a way as to add up to a dimension slightly larger than the diameter of the tube. Rhomboid figures will telescope in such a way but a rhomboid cannot be called a cube. I cannot believe that cubes and tubes were ever used together; there is a basic clash in their geometry. On the other hand, the Greeks could cast or forge metal balls just as easily as they could manufacture cubes. These balls would not jam in the tube, for as long as the diameter of the spherical lots was nearly as large as that of the tube, one ball could not wedge itself between another ball and the wall of the tube.

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Hesychius defines *κήτιον* as an implement for ramming psephi in cleroteria. Dow (H 14), assuming cubical lots, thinks that the cetium was a long thin rod which could free lots when they jammed in the tube; and he wants to put a kind of shepherd's crook on the end, making it a lifter rather than a rammer. But in the tube we both visualise, not only would the rod not be needed but one would not have space to manoeuvre the rod, let alone the hook, past the lots stacked in the tube: compare the stylised drawings of the tube. There is the additional problem of understanding how in the world the balls in the tube could possibly get into a jam. But the lots were poured into the cone, and then they fell into the tube. It is quite possible—indeed probable—that two or more lots frequently came together in the cone in such a way as to bridge over the entrance to the tube and prevent themselves, or any other lot, from falling into the tube. At this point the cetium is useful. Random poking would dislodge the lots, and they would fall into the tube naturally. Perhaps in a large dicastic allotment the archon would have to prod the lots in the cone more than once. Certainly the cetium here is a better tool than the archon's bare hand: too much danger of manipulation. Further, it seems probable that if such jams occurred in the cone, a quick and knowing eye could note the order of the lots as they were dislodged. If the mixing bucket were upended over the cone as a concealing cover, then the cetium must have been inserted under the rim of the bucket. Presumably this precaution would have been taken—covering the cone with the bucket—both in order to preserve the secrecy of the random order (for one could always peer into the top and see the top ball) and to prevent the lots from spilling out of the cone when the cone was jammed and could not let the lots fall through naturally. Of course, a rod with a small hook on the end would seem more useful since it could be operated with an up-and-down motion; however, Hesychius does specify a prodding, not a lifting action: *κήτιον· μέγαν καὶ ᾧ τὰς ψήφους διωθοῦσιν ἐν τοῖς*

κληρωτηρίοις. That is, the cetium pushed the balls around until they began to fall into the tube.

* * * *

Athenaeus x 450b quotes a riddle from Eubulus which states that the rejected candidate wandered off crying φυλάσσειν. I quote from J. M. Edmonds, *The Fragments of Attic Comedy* (Leiden, 1957–61) ii 130–33, *fr.* 107, lines 21–5; Dow quoted Gulick's Athenaeus (LCL).

ἔστιν ἄγαλμα μεμυκὸς ἄνω, τὰ κάτω δὲ κεχηνός,
εἰς πόδας ἐκ κεφαλῆς τετρημένον ὀξὺ διαπρό,
ἀνθρώπους τίκτον κατὰ τὴν πυγὴν ἕν' ἕκαστον,
ὧν οἱ μὲν μοίρας ἔλαχον βίου, οἱ δὲ πλανῶνται,
αὐτὸς ἕκαστος ἔχων αὑτὸν καλέων δὲ φυλάσσειν.

Dow (H 12) considered the infinitive to be a commonplace expression of disgust, disappointment, and ill-temper: the still-born infants 'may be thought of as murdered, thirsting for revenge, and hence calling out threateningly to beware'. Granted the emotional climate and the commonplace, what does the infinitive mean, and who is to do it? If it is merely a commonplace expression of disgust, e.g. 'Look out, now!', then the operator is the one addressed, and the rejected man is to be commended for not using much stronger language, whether in politics or in Old Comedy! But really, grammar is against taking the infinitive as an imperative in disguise. The parallel given by Eubulus seems to carry another hint. The ghosts of still-born infants would more appropriately watch for flaws in order to penetrate the protective barrier, rather than utter cries of warning or disappointed ill-temper. Hence a better parallel between the infants and the rejected 'still-born' jurors is found in reading the infinitive as 'I am on the watch against irregularities', the subject of the infinitive being taken from the controlling verb. A disgruntled, rejected candidate would make a most efficient, persistent, and vocal watchdog against irregularities. Just as still-born infants were a well-known danger for a family, so the defeated allottees were a well-known hazard for the operator. We do not know what happened if an irregularity was detected. No doubt something drastic. Is there anything more to πλανῶνται for the rejected than that they could and did wander around the court complex (outside?) since they had no term of office (μοίρας βίου)? Was it only natural for them to go and heckle their friends or enemies, or was there some special function or inducement or reward of a semi-official nature if they did act as 'watchdogs' against the operators? Certainly the law encouraged 'watchdogs' in the dicastic allotments; it required it of the dicasts in the first courtroom during the *synclerosis*; who else kept watch, officially or semi-officially?

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The basic form of the allotment procedure, whether actually used or already refined when put in use, required only a vessel to hold the lots. The allotment was then made in a direct fashion. A lot and a man were paired as each man presented himself, whether an official selected the lot or the man himself did. One merely reached into the vessel and took out a lot, thus accepting or rejecting the candidate. Manipulation could occur, particularly under crowded conditions and in large allotments, (1) when a man re-presented himself, (2) when a man wrongly took an allotted place either after being rejected or through a false claim to the right to undergo allotment, (3) when by sense of touch one certain lot was selected or rejected, (4) when an unsatisfactory first lot was illegally and surreptitiously replaced by a second, (5) when the candidate exercised persuasion or even force of some kind. Malfunctions such as these caused the procedure to be redesigned, especially for

the larger allotments, presumably in several stages. That there are two names for the two main parts of the existing devices—cleroterium and canonides—and that one part exists in a form apparently somewhat contrary to its name indicate two separate developments which were then united in a third stage now shown in the remains which Dow has analysed.

Re-presentation, illegal claims, and illegal pressure by the allottee could be controlled by an identification system which separated the allotter and the allottee at the moment of allotment, and which could be made a matter of public record. This is the stage shown by the canonides and pinacia. The canonides are most simply made by cutting a slot lengthwise, with the grain, in a small wooden bar. These pieces, presumably the equivalent of a modern 2 in. × 2 in. strip, are best engineered into a horizontal rack because of the nature of the material; daubs of paint would mark off any needed subdivisions on each canonis. Dow had originally hesitated over the horizontal setting of the canonides, conceding the point to previous scholars and the LSJ lexicon, and concluding that the stones are descendants rather than copies of the Aristotelean cleroteria. But in H 8 he believes that the Aristotelean and the marble models are quite similar. The change is due to LSJ's handling of *IG* ii² 1672.155 *σανίδες μελίναι τρεῖς εἰς κανονῖδας καὶ ξυγὰ ταῖς θύραις, τιμὴ τῆς σανίδος* κτλ., where canonis is glossed as 'door-frame' and zyga as 'panelling'. LSJ is certainly in error here, though to correct it does not change Dow's point. A doorframe includes the two jambs, the vertical setting of which influenced Dow, as well as the lintel or head and the sill or threshold (if one be included), both of which are horizontal. LSJ therefore both does and does not support the idea of the vertical in canonis. Granting for the moment to LSJ the meaning 'doorframe', we would expect to find the canonides to be the jambs and the zyga the lintel and sill. But the dative *ταῖς θύραις* indicates also the doors proper. In a batten-and-braced door, the canonides would be the battens and the zyga the braces; in a panelled door, the canonides would be the stiles (or vertical pieces) and the zyga the rails (or cross-bars), the panels being framed by the stiles and rails. Elsewhere zygon and its cognates are similarly used. Is it possible that LSJ misunderstood Paton and Stevens, *The Erechtheum* (Cambridge, Mass., 1927) 317, 'The doors . . . were evidently carved to imitate the forms of wooden doors with vertical stiles and horizontal rails (*ξυγά*) forming panels'? Vitr. iv 6.4, iv 7.5, uses *tympanum* for panelling and similar features. The notion of the horizontal or the vertical in canonis does seem to be secondary to the concept of 'straight demarcation', as Dow concluded (H 6); further, in cleroteria, doorframes, and doors, they are the pieces which mark out the effective working areas.

The use of multiple parallel canonides for the allotment of many persons, whether the bars were racked horizontally or vertically, is completely described in H 5–6. Manipulation is prevented by making a public display of the names, not the persons, of those who are to undergo one particular allotment. As the allotment proceeds, only those names on public display can be allotted: there can be no fraudulent re-presentation. After each step, those accepted remain on record, those rejected do not. When applied to the process seen in Aristotle's account, 'on record' is the equivalent of 64.4 'the archon throws the pinacium of the selectee into the box inscribed with the letter which is on the balanus'. There can be no illegal claim to have already been accepted. Since the person or agency performing the allotment deals only with impersonal objects, he is freed from the persuasion and personal force inherent in the face-to-face encounter of direct allotment. Pinacia, like the canonides, were at first made from the easiest material at hand: wood; hence their name. When issued as part of the process of establishing citizen eligibility, they would prevent abuse by persons not eligible for the right of allotment. Since Aristotle notes the procedures for fraudulent eligibility, this must have been a serious consideration. The principal cause for non-eligibility was apparently debt to the public treasury (*Ath* 63.3); age and loss of franchise are also mentioned. These are citizens whose full rights were diminished in some way. The use of pinacia had already screened out the non-citizens.

Manipulation of the lots in order to secure an illegal allotment could be controlled by a method of automatically selecting a lot. The Homeric method was to put the lots in a vessel (in Homer, a helmet was the handiest) and to shake until a lot flew out, thus selecting the man for the office. It is certainly possible to pre-dispose selection here by controlling the size and weight of the various lots; gamblers still rig dice games by tampering with the weight and shape of their dice. Misfires when two or more lots might show seem to be an equally great hazard unless some sort of partial cover were provided. Drawing a lot by hand has the advantage of producing one lot at a time, but as noted above, sensitive fingers can search for a particular lot, and clever prestidigitation can dispose of an unwanted lot as it is being drawn. The Athenian cleroterium, as Dow saw, strongly hinders manipulation. The tube therefore fulfils the need.

As for the reason why the lots were called cubes when obviously our remains require balls, and balls have been found but no cubes, the explanation must lie in the history of the procedure. The first lots in the official Athenian process were of course cubes; hence the name. These are most easily made by taking a piece of lumber, e.g. something like a modern 1 in. × 1 in. finished strip, and cutting it into pieces. These will be cubes, more or less. Since they could not tumble freely through a tube, perhaps they were shaken out of a vessel one at a time, as in the Homeric method, extracted by hand, though fingers would easily be able to differentiate one from another because of chips, splinters, variations in the grain, size, cut, knots, etc.; indeed more than one could be scooped out in the hope that the extractor could quickly judge which lot he wanted and discard the other before the illegality of the act be noticed. No doubt an explosive scandal occurred which caused the invention of the tube. At that point the cubes became balls, but the technical name was kept, *κύβοι*; as also *κανονίδες*, *πινάκια* (cf. *Ath* 63.4, where they are still wood), *βάλανοι*, even though the materials were changed, the shape altered, and the process reorganised and reoriented. This is proved by remains from outside Athens. The Roman decree from Cyrene cited by Dow from G. Oliverio, *Notiziario Archeologico* iv (1927) 20, lines 24–7, contains the phrase *τότε σηκωθεισῶν τῶν σφαιρῶν καὶ ἐπιγραφέντων αὐταῖς τῶν ὀνομάτων.* Oliverio, p. 43 n. 1, refers to Asconius (wrongly cited by H 14 as Ausonius but corrected in PW) *In Milonianam O.* c. 40, 148, 23 (= A. C. Clark's OCT edition, par. 34, p. 39, lines 18 ff.): . . . *pilae in quibus nomina iudicum inscripta essent.* . . . The more realistic terms for the lots show that the Athenian device was the first one built and the technique but not all the technical terminology was borrowed from Athens; the retention of the old names at Athens is indeed attributable to legal conservatism.

I would suggest that the canonides and the pinacia were the earlier refinements because of the pressing need to know what happened to whom, and because one should expect the rack to share the name of the cleroterium without one of its own if it merely developed later as an appendage to the tube. The use of names which are as particularising and as distinctive as these shows that the two larger parts—canonides, cleroterium—were at first separate.

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In the running of the Athenian government, the next tribe to serve as prytaneis was not chosen until just before the start of the next term. The suggestion was made (P 211) that the prytany lots were stored in the tube during the year until each had been drawn in turn. The staggered allotment of term of office worked to prevent collusion; but storage in pre-determined but as yet unknown order invited collusion. Give a man five minutes alone with the tube and he could tell what the order was or even rearrange it. For neither the cup nor the spit release prevents anyone from drawing a lot surreptitiously, observing it, and then stuffing it back up the tube by operating either release in reverse. It hardly

seems easy to design a simple release capable of preventing such an action. Hence the prytany lots were not stored in the tube for up to ten or eleven months until drawn; but the cleroterium was prepared anew each time. Indeed if I is the type used for the prytany allotment, one could easily determine at any time which tribe was last merely by peering down the tube to see which was the top ball; a cover would provide a hindrance, but curiosity and the thought of opportunity would circumvent that.

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And lastly, it seems a waste of expense (*cf.* H 24–5, etc.) to equip each of the paired dicastic cleroteria with its own tube. Would it be possible to detach the tube from the first stone and, so to speak, plug it into the second at the right time? As we noted above for I, the very existence of the upper cleat hole argues against the assumption that in its pristine state the stone and its tube were indissolubly leaded together. The indication is strong that the tube indeed was plugged into I at the time of allotment, but then removed. A simple wooden shim to wedge each cleat in place would not only hold the tube steady during its use but also permit easy removal of the tube. In H 10, Athenaeus xiv 640b–c (= Edmonds ii 114–15, *fr.* 74 which I quote; Edmonds neither here nor in *fr.* 107—see p. 10 above—took advantage of Dow's work) is used as proof that the cleroterium was portable and saleable.

ἐν τῷ γὰρ αὐτῷ πάνθ' ὁμοῦ πωλήσεται
ἐν ταῖς Ἀθήναις, σῦκα, κλητῆρες, βότρυς,
γογγυλίδες, ἄπιοι, μῆλα, μάρτυρες, ῥόδα,
μέσπιλα, χόρια, σχαδόνες, ἐρέβινθοι, δίκαι,
πυός, πυριάτη, μύρτα, κληρωτήρια,
ὑάκινθος, ἄρνες, κλεψύδραι, νόμοι, γραφαί.

Whether or not two speakers interlaced their comments, there certainly is a double flow of items, the second series being a list of politico-legal things. The humour in the lines rests on the fact that the second list contains not parts of cuisine but parts of processes. For if a cleroterium can be purchased and carried home, so can κλητῆρες, νόμοι, and γραφαί. But this is absurd and does not fit the comic possibilities unless one can prove that every item on the list was on a cash-and-carry basis. But is not this the process of bribing? No indication therefore of portability, though I believe that the cleroteria—that is, the tubes by themselves—were carried from a storage area to the area where they were to be used. But the full meaning of this passage has not yet been uncovered.

But if the tubes were left out in the open, attached permanently to their stones, would not *Natura*—or rather *Fortuna*—find the opportunity too tempting? Spiders probably would be a negligible hazard; presumably fieldmice would not find the tube a congenial substitute for a burrow, nor birds for a hollow tree, though perhaps small boys might have and relish the opportunity to drop trash down the tube. But bees and wasps—mud-daubers, for example—look for such recesses and can rapidly build structures quite large enough to plug a tube; their eviction could be uncomfortable and disruptive. No doubt there are other natural hazards which would urge safe storage of the tube together with the balls.

We have already noted two, perhaps three, even four, sizes of balls for the tubes. The implication is plain that a special tube and set of balls were assigned to certain functions. The stones then were set permanently in place; but the tubes were installed just prior to the allotment proceedings. Permanent installation in an inconvenient position seems to be an excellent explanation for the less neat work in the recutting of II. Thus the distinction between cleroterium and canonides was a very necessary one, even though Dow's stones

show that they were assembled each time into one device. Perhaps Dow was right in his first assumption that his stones are descendants rather than copies of Aristotle's machines; yet at least one seems to be an ancestor; but certainly even in his stones the distinction between cleroterium and canonides is very strong. One would think then that Dow's suggestion (P 211) that the prytany lots were stored in the tube might have some merit after all; for a detachable tube could be put under guard in a special closet. But a guard could be bribed; a locked closet could be opened; a secret worth much money cries out to be discovered. What other aspect of the Athenian political process could be cited as a parallel for this kind of trust and trustworthiness?

I wish to thank W. G. Forrest for some excellent criticisms; his cool glance at some of my argumentation has been quite informative as well as enjoyable and at times of wry amusement to me. I hope that the next student will be able to coordinate more successfully the various chronological hints with the known history of the period. And I look forward to some man of words who will bring to life the bustle, the noisy humanity, the political subtlety of those involved in the dicastic process at Athens.

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