

On the practical application of autography in Zoology, and on a new autographic method

by

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Autography is a process that has been long well known, for transferring to a lithographic stone, and impressing on it simple marks and figures, which are executed on common paper by means of a pen and a particular sort of ink. This extremely simple and cheap method has however always had hitherto only a very limited practical application, that is chiefly for the reproduction of original manuscripts, hieroglyphics or other simple figures, for which the ordinary type does not suffice. This method was, so far as I know, applied for the first time in our country by Mr. Lieblein, who in one of his *Ægyptological* works published in 1873, has added some pages of hieroglyphic writing executed in autography. On seeing this work, it occurred to me immediately that in case of need, this method might be made use of, not only for writing, but also for the representation of the more simple zoological objects, by which means we should in any case be able to avoid one of the chief obstacles which in our country have unfortunately too often stood in the way of zoological investigation, namely the considerable expense connected with the production in the usual manner (by lithography or copper plate engraving) of the illustrative figures necessary for all descriptive zoological works. I had just then in hand a zoological treatise communicated to our scientific society (*Bidrag til Kundskaben om Norges Hydroider*), and determined at once to make an experiment, and to add to my treatise the necessary figures of the new or less well known forms, in autography. The result of this (so far as I know) first attempt to apply autography in zoology, far exceeded

my anticipations. By employing a particular kind of paper, and the finest drawing pens, I succeeded in representing many details, which I did not think could have been expressed in this manner. The 4 additional plates which may be seen in the printed transactions of the scientific society for 1873, are certainly in fineness and elegance inferior to lithography; but still they represent tolerably well the most important features of form and structure, and are, in any case, of essential utility for the understanding of the treatise. I have likewise illustrated, with figures executed in the same manner, a few other treatises introduced into the transactions of the scientific society for the following year. There are however several inconveniences connected with this ordinary autographic method. In the first place it requires great practice and a very sure hand to make a good drawing in this manner. Secondly the ink employed will only to a certain extent retain its suitable consistence, and soon becomes so concentrated by evaporation as to render the drawing of pure lines very difficult. Moreover the shading, so indispensable for many zoological figures, can only be expressed very imperfectly in this manner. Finally an error in the drawing cannot be corrected. I could perceive therefore that this method could only find a limited application in Zoology, and essentially only in outline drawings; while on the other hand, where it is requisite to express finer histological features or soft shadings, we must still depend on the assistance of the lithographer or engraver.

As however I had now made a beginning in this matter, I determined to make a number of technical experiments, in order if possible to remedy these defects in the autographic method formerly employed. After some unsuccessful attempts to introduce the ink formerly employed, in a more or less diluted form into the drawing with a pencil, the lucky idea accidentally occurred to me, that I might employ the same material used by the lithographers for crayon-drawing on stone, namely lithographic chalk. In that intention I put myself in communication with Mr. Fehr the lithographer, who with the greatest obligingness offered me his assistance, both in procuring the necessary materials and transferring to the stone, as also in printing the drawings which I intended to execute. Already the first attempt with this new method surpassed my boldest expectations, and highly surprised also Mr. Fehr the lithographer.

Although the drawing (a little fish) was executed on ordinary smooth paper, a perfectly clear and good impression was obtained; not even the smallest stroke nor the finest shading was wanting. It was however still undecided whether from a drawing executed in this manner, a sufficient number of impressions could be taken. This point had therefore first to be settled, before any confidence could be placed in the practical application of the method. As I had just then in hand the University program recently published („Researches on the structure and affinity of the genus *Brisinga*“) and as during the progress of the work it had been found desirable to append to the treatise a number of additional figures, besides those which had already been executed in copper engraving, I determined as a beginning to execute with all possible care a complete plate for this work, according to the new autographic method here noticed, and run the risk of being able to obtain from it the 850 impressions necessary for the whole edition. The result was in all respects satisfactory: the 850 impressions were quite as clear and sharp as the first. The practical application of the method was thus completely demonstrated; and I had therefore no hesitation in adding to my treatise two more plates executed in the same manner. At present I have in hand another zoological treatise (on the Mollusca of the arctic region of Norway), which will be accompanied by about 20 plates all executed in this manner. 14 of these are already finished as regards my hand in them, and impressions of all 14 have been taken which have turned out to my best satisfaction. Of these I have sent copies round to several of my foreign correspondents, and all agree in placing them completely on a level with ordinary lithography. I append to this paper copies of pl. 13 and 14 as specimens. After having now had the necessary practice, I am convinced that it is possible by help of this method to express even the finest features of structure, and therefore that this extraordinarily simple and cheap method will, for zoological purposes, be capable of replacing entirely the productions of lithography and copper-plate engraving, which are connected with such great expense. Such great and essential advantages are hereby obtained, especially for zoologists, that I consider it of the greatest importance to bring this method as soon as possible into general notice. It is unnecessary to add that it is far from my intention to attribute to myself the honor of having made any new discovery in the domain of

art. The thing is in itself so extremely simple and straight forward, that there can be no doubt as to something similar having suggested itself to many before me; and moreover there is here, as may easily be seen, in fact only a notice of a principle which in its essential features has been long known. But it is the extraordinary extensive practical applicability of this principle, which I have been so fortunate as to be able to establish by my experiments; whereat I greatly rejoice, for as much as I believe thereby to have rendered a very essential service to zoological investigation. It may be added that the successful result of my experiments is entirely owing to the warm interest which Mr. Fehr took in the matter, and to his great readiness to assist me in my attempts.

I shall now endeavor as clearly and precisely as possible to describe the process in this improved autographic method, which, as has been shewn, offers many and essential advantages over the method previously employed with the pen and ink.

The drawings are executed on ordinary not too thick paper (preferably on common post paper) which, on one of the sides (that whereon the drawing is to be made) is endued by means of a sponge with a thin coating of starch. As it is not expedient for the sake of the shading, to draw on perfectly smooth paper, the paper is grained artificially, which may be done quite simply by pressing it against a grained lithographic stone. Accordingly as a finer or coarser stone is selected for this purpose, any degree of fineness may be given to the paper, in harmony with the conditions of the drawings. A piece of the paper answering to the dimensions of the plate is attached in the usual manner to a drawing-board or to a piece of card-board in order to have a firm foundation; and now with the help of lithographic chalk¹⁾ the drawings may be executed in the order in which they are to be reproduced. The execution is extremely simple; and any one who can

¹⁾ I use for my autographic drawings a particular sort of chalk, recommended to me by Mr. Fehr the lithographer, which has been treated with copal („crayons copal“) and therefore is less brittle than the chalk commonly used. As this sort of chalk appears also in other respects to offer essential advantages, it ought unquestionably to be employed for the purpose above noticed. It may be had in boxes of Mr. Lemercier, lithographer at Paris (rue de Seine St. G. 57).

draw will easily be able to acquire the necessary dexterity. The method is exactly the same as in ordinary lead pencil drawing, or rather as in drawing with black chalk. The figures, must, at least in outline, be traced beforehand on ordinary paper. The transfer to the prepared paper takes place in the usual manner, by means of transparent paper and through tracing (for this purpose black lead paper, or preferably red chalk paper may be used). The outline may afterwards be traced over with a not too soft lead pencil. The detailed execution of the drawings, the shading and the finer features of structure, can be done immediately with the lithographic chalk. If a mistake has been made in the drawing, or if any alteration is required, the alteration may easily be effected by erasure with a fine lancet, if only care is taken not to remove the coating of starch. I have in this manner effected many corrections in my drawings, without the impression having suffered in the least degree. When the drawing of the plate is finished as required, it is transferred on to an ordinary smooth lithographic stone, which is effected in the following simple manner: The plate is wetted on the reverse side with water to which a little nitric acid (aqua fortis) has been added; and, after having been allowed to lie for some time, between sheets of similarly wetted waste paper, it is to be placed carefully with the other side (with the drawings) against the stone, whereupon the latter is put for an instant under the press. The plate adheres now of itself firmly to the stone; so that one may even, for the sake of greater certainty, rub the exterior side with the fingers, in order further to accelerate the separation of the drawings from the paper. On raising the paper from the stone, the drawings, together with the whole coating of starch, will be found completely separated from the paper and fixed to the stone in a reversed position. The stone is treated in the customary manner with gum arabic and a weak mordant, and it is then ready for use; so that impressions can immediately be taken in the usual well known manner. It must be remarked that the transfer of the drawings to the stone, although as may be seen, extremely simple in its main features and quite identical with the method adopted in ordinary autography, requires great care and manual dexterity; for which reason it ought to be entrusted to a man well skilled in lithography.

It might now seem as if zoologists, by taking on themselves in this manner the execution of the plates

belonging to their works, would have an extraordinary increase of labor. This is however more apparent than real. The drawings must in any case be executed by the zoologists in some way or other, before they can be copied by the lithographer or by the copper-plate engraver; and whether they are drawn with a lead pencil or in the autographic manner here described, the difference in labor will be very slight. The only difference is that the zoologist, in employing autography, must himself arrange his figures in the respective plates, a thing which has previously been usually left for the lithographer to do; and it is of course necessary that the figures belonging to one and the same plate, should be executed in a somewhat continuous order of arrangement. This increase of work is of no account at all, in comparison with the great and essential advantages which the zoologist obtains by the employment of this method.

These essential advantages are briefly as follows:

- 1) *Great cheapness.* The extraordinary difference in this respect between a plate executed by the autographic method and a lithography or copper-plate engraving, will be manifest from what has previously been stated. The expense will in the former be reduced to the cost of paper and printing, whereby such a plate may be produced cheaper than a corresponding page of ordinary letter press! It follows as a matter of course, that the most complicated drawing will not cost more than the simplest, and likewise that the expense may be still further reduced by transferring several plates at the same time to one stone. Thus by employing this process, we shall be enabled to illustrate our treatises with as many figures as may be required, without any unsurmountable expense of publication such as has been too frequently encountered hitherto, while the illustration of the works depended on the lithographer or the engraver. There will therefore henceforth be opportunity, even for a poor country like ours, to keep pace in zoology with the greater nations, as regards the publication of important illustrated works.
- 2) *Accuracy.* If we are to have our delineations executed at second hand by a lithographer or engraver, however conscientiously he may do his work, there will inevitably creep into it some greater or smaller

errors, which, when the plate is once finished, it may be difficult or impossible to rectify. By the method here explained, this is entirely avoided; as it is the author's original drawing which is reproduced, a circumstance which will give to the plates thus executed a very greatly increased value in a scientific point of view.

- 3) *Rapidity*. One of the greatest disadvantages in the method formerly adopted of illustrating zoological works (by lithography or engraving) is, that we must depend entirely on the artist's greater or less promptness in executing his work. We have unfortunately many instances of the publication of a work being by that cause delayed to an inconvenient season, nay year after year, to the great prejudice of the author and of his treatise, which will frequently thereby be made to appear more or less antiquated, when at last it comes out. Nothing is on the whole more unpleasant for a working zoologist, than to find himself thus stopped in his progressive researches. All this may be completely avoided by employing the present autographic method. If the plates are ready, the whole edition of them can be finished in a few days, and the publication may thus take place without any delay.

It may be objected as against these great and manifest advantages, that this method and the advantages connected with it can only profit the zoologists who themselves can draw; while the zoologists who are without skill in drawing are just as badly off as before. To this it may be answered, that at present it must be considered an essentially necessary condition for a zoologist to be able to draw. There are many cases in which, with ever so accomplished an artist by his side, he could not get on at all. In order to be able to draw zoological objects, it is not sufficient to possess manual dexterity; it is requisite in addition to possess the quality so essential, and indeed absolutely necessary, for an able zoologist, namely that of having a zoological eye or faculty of observation. This is a faculty which is not given to every one, and which even in zoologists is very differently developed. In many cases it is, especially in microscopic investigations, only a glimpse that one gets of some peculiar feature or other. The zoologist must be able to catch up this on the spot, and interpret it so as to be able immediately to

represent on paper what he has seen. Thus in order to draw zoological objects, it is generally requisite to be one's self a zoologist; and to be a complete zoologist one must also be able to represent what one has observed, not only in words, but also pictorially.

Some zoologists have recently, in order to avoid the great expense connected with the execution of drawings at second hand by the lithographer, attempted themselves to undertake the latter's part, by executing their own drawings at once on the stone. A plate executed in this manner will of course be identical with an autography. But for this, very great practise is necessary, and quite a special study of lithography, which could not at any rate be taken for granted, unless in the case of a very small number of zoologists. It is however evident that all the same advantages may be obtained in a much simpler and easier manner, by the new autographic method here noticed. Nay it will even be found that this method offers some very essential advantages over the direct drawing on the stone. Besides the inconvenience that for the zoologist will always be connected with having on his work-table an unhandy lithographic stone, the treatment of which requires moreover the greatest care, it will be extremely difficult to effect any corrections in the drawings executed thereon; while on the contrary, such corrections can be made, as above stated, with the greatest ease on the paper employed in autography. Add to this the great and essential inconvenience in the direct drawing on the stone, that the figures must be drawn reversed (like negative or mirror images), which in the delineation of many things, for instance spirally twisted shells, will be connected with extraordinary difficulty for the zoologist. But in the autographic manner, the drawings will be executed in the usual way, and, when transferred on to the stone, will naturally stand reversed; so that the impressions will be again perfectly similar to the original drawings.

I have above only noticed the importance of this method for zoology. But it is clear, that the same method will also find extensive application in many other spheres, both for more practical purposes and for artistic representations of every sort. The method will especially in this latter respect be of great importance; for as much as it supplies the means of obtaining immediate reproductions of original drawings to an unlimited extent.