

SMITHSONIAN MISCELLANEOUS COLLECTIONS.

INSTRUCTIONS

IN REFERENCE TO

COLLECTING NESTS AND EGGS OF NORTH
AMERICAN BIRDS.

INTRODUCTORY REMARKS.

THE Smithsonian Institution is desirous of collecting as full a series as possible of the nests and eggs of birds of North America, with the view not only of exhibiting them in its museum, but also to serve as materials for a work on North American Oology, to be prepared by Dr. Brewer, of Boston, and published in successive parts by the Institution.

This memoir is intended to give an account of the geographical distribution of North American birds, as well as of their habits and peculiarities during the breeding season, and to be accompanied as far as possible by accurate figures of the principal varieties of the egg of each species, based upon photographic drawings. Of this work, the first part, embracing the *Raptores* (vultures, eagles, hawks, and owls), and *Fissirostres* (swallows, swifts, and goatsuckers), has already been published.

The object contemplated by the Institution is thus not merely to procure specimens of eggs not previously in its museum, but also to obtain positive evidence as to the limits within which each species rears its young. For this reason it respectfully invites donations from all parts of the country of as many kinds of nests and eggs as can be obtained, with the exception of a few of the very commonest species hereafter mentioned; and asks that especial attention may be directed toward making the collection as complete as possible for each locality. As duplicate eggs of all kinds, and in any number, can be readily used in the

exchanges of the Institution, and in supplying other cabinets, no fear need be entertained of sending more than enough for the purposes in view.

The eggs, of which a single set only need be collected for the present, are chiefly those of the eastern bluebird (*Sialia sialis*), the robin (*Turdus migratorius*), the cat-bird (*Mimus carolinensis*), the red-winged blackbird (*Agelaius phoeniceus*), and the crow blackbird (*Quiscalus versicolor*). Those to which particular attention should be paid as groups, are the eagles, hawks, owls, woodpeckers, small waders, ducks, &c., of all portions of the country; but, as stated, all kinds of eggs, and particularly those from the regions west of the Mississippi, and from the northern parts of America, are desired. A subjoined list embraces the species more particularly desired by the Institution; especially those having an asterisk prefixed, which are, with few exceptions, entirely unknown to science. The numbers in the list refer to a printed catalogue of North American birds, published by the Institution, which will be sent to any one who proposes to collect eggs for its museum.

The attention of collectors and correspondents is particularly invited to eggs of the following easily identified and well-known birds: The California condor or vulture (*Cathartes californianus*), and the golden or ring-tailed eagle (*Aquila canadensis*); the swallow-tailed hawk (*Nauclerus furcatus*), the black-shouldered hawk (*Elanus leucurus*), and the Mississippi kite (*Ictinia plumbea*), of the Southern States; the duck hawks (*Fulco anatum*, etc.), and the speckled partridge hawk (*F. candicans*), of the North. All the black and other Rocky Mountain hawks; all the owls, especially those breeding in the North, as also the burrowing owls of the West; the ivory-billed woodpecker (*Picus principalis*), the red-shafted flicker of the West (*Colaptes mexicanus*), the Rocky Mountain bluebird (*Sialia arctica*); all the warblers; the Bohemian wax-wing (*Ampelis garrulus*), the violet green swallow (*Hirundo thalassina*); the black swifts or swallows of the Rocky Mountains and the Northwest; the Rocky Mountain wrens and nuthatches; the Canada, Steller's and Rocky Mountain jays generally, including the Piñolero; the band-tailed pigeon of the Rocky Mountains and West (*Columba fasciata*); the New Mexican and Rocky Mountain wild turkey (*Meleagris mexicana*); the dusky or black mountain grouse

(*Tetrao obscurus*); the spruce partridge (*Tetrao canadensis*), and all other grouse and pheasants; all the crested quails or partridges of Western Texas and New Mexico; the white prairie or whooping crane (*Grus americana*); the courlan, water hen, or crying bird of Florida (*Aramus giganteus*), all the snipes, sandpipers, plovers, curlews, ducks, geese, swans, gulls, and terns of the interior, as well as the different flycatchers, sparrows, etc.

The following details furnished by Dr. Brewer, are believed to contain the most important instructions necessary for the preparation and preservation of oological collections:—

INSTRUCTIONS FOR COLLECTING AND PRESERVING.

The nests of birds are to be sought for in all localities and in various months of the year according to the latitude, May and June being generally the most productive. Many of the rapacious birds, however, begin to lay much earlier in the middle States, even in February and March. This is especially the case with the bald eagle, great-horned owls, etc. Others again will be found breeding in July and August.

When a nest containing eggs, or one newly constructed, is discovered, it should not be disturbed, if possible, before the parents have been observed hovering around or near, and thus identified. If the species cannot be otherwise positively determined, and generally in any case, a parent bird should be secured, and either the whole skin be prepared, or a portion—as the head and wing—preserved for identification. The bird may also be thrown into alcohol, and thus easily kept.

The services of boys and other persons on farms, plantations, &c., may be called to great advantage into requisition in collecting eggs. Whenever they have found a nest, however, it should not be disturbed before information is communicated to, and the spot visited by some one competent to determine the species, unless the parents can be taken with the nest. No pains should be considered too great to secure the certain identification of each set of eggs. Horse-hair snares arranged about a nest will often secure the parent bird. If identification be impossible, however, the eggs should still be preserved, as the species can usually be approximated to, if not absolutely determined, by an expert oologist.

Sometimes by removing all the eggs in a nest, except one or two, without handling those left, quite a large number can be obtained from one pair of birds; generally, however, the nest will be found abandoned on a second visit.

The nests may not always be removable. In such cases, full mention of their position, character, &c., should be carefully made. Nests constructed in bushes or on trees usually need but slight precautions for their preservation intact. Those on the ground often require to be secured against dropping to pieces by a little judicious wrapping, or tying together, or even by a few coarse stitches with a thread and needle.

A little cotton packed in the nest above the eggs will generally keep the latter whole until reaching home, unless subjected to a violent shock. It will be safer, however, to inclose each one in an envelop of cotton.

It is absolutely necessary, in all cases, to empty every egg of its contents, in order to preserve the shell for cabinet purposes; and this should be done at the earliest moment possible. It is accomplished in various ways: the simplest, when the egg does not contain an embryo, being to prick a small aperture at each end, on opposite sides, with a sharp needle (a three-cornered one answers best), or an egg drill, one aperture rather the larger, through which the contents are blown by the application of the mouth at the other. Delicate eggs, however, when fresh, can be best emptied by suction, a small quantity at a time of the contents being drawn into the mouth, and then discharged. European collectors generally make two apertures near the extremities, that towards the blunt end the larger; or else a single hole in the side through which the contents are emptied by the blowpipe or syringe. This is much the better way, when a blowpipe can be procured.

Should there be an embryo in the egg, or should the contents have become thickened by long standing, it will be necessary to make a larger aperture in the side by cutting out a circular piece of shell carefully with the needle or drill. A smaller hole may then be made opposite to this, at which to apply the mouth in blowing, or the embryo may be picked out through a single large hole. It will be of much interest to preserve all embryos in alcohol for further investigation. The discharge of the contents of the egg is facilitated by the use of a small blow-

pipe or tube, the smaller end so fine as to enter the smaller aperture. A stream of water injected by the mouth through the tube into the aperture will be found an expeditious method of emptying the egg, but it must be conducted very carefully. When a large hole is made, the tube may be directed through it to the opposite side of the egg, and a current of water forced in this will soon discharge the contents. A syringe, with slender fine point, will be found an exceedingly convenient instrument, as a discharge of water through the pipe into the egg will empty it very rapidly, and serve to wash the inside afterwards. Great care must, however, be exercised not to use much force or haste in this, as there is much danger of bursting the egg. When practicable, the white membrane, the edge of which usually protrudes from the opening after the liquids are forced out, should be seized with a pair of forceps and pulled out, as, if left, it may discolor the egg, and will always attract insects. If not too small, the egg should then be partly filled with water, by means of the tube or syringe (or by laying one hole against a saucer of water and sucking through the other), and carefully rinsed out. After the water is again blown out, the egg may be allowed to dry by placing the larger hole downwards on blotting or absorbent paper or cloth. When dry, the eggs should be replaced in the nest, or laid carefully away, care being taken to add a number or other mark showing the locality, position of the nest, whether on the ground, or in a bush or tree, etc., date, collector, and supposed species, as well as relationship to an embryo removed, or to any portion of the parent preserved. It will in most cases be best to give exactly the same number to nest, eggs, embryo, and parent belonging together. This mark may be made neatly on the eggs (best with ink and a quill pen). A record book showing what has been taken and preserved, with dates and explanatory remarks, should always be kept.

In making the apertures in eggs that have peculiar markings, care should be taken to select some inconspicuous spot that will leave the pattern of coloration undisturbed. Eggs that are cracked may be greatly strengthened by pasting tissue or other thin paper along the line of injury, or what is easier, and in most cases even better, by brushing collodion along and over the cracks. It is often well to cover the punctures or holes cut

out, especially if large, with thin paper or silk or goldbeaters' skin. If a piece be removed, it can usually be easily replaced and kept in by pasting thin paper over it and the line of separation, or around the latter.

Notwithstanding the apparent fragility of eggs, a very little experience will enable any one to empty them of their contents with great ease and safety. The principal accident to be guarded against is that of crushing the egg by too great pressure between the fingers; these should be applied so as to barely hold the egg, and no more. If the operation of emptying be performed over a full basin of water, the occasional dropping of the egg from the finger into the water will be attended with no harm.

To pack eggs for transportation, each one should be wrapped in a light envelop of cotton and laid down in layers separated by strata of cotton. They should be kept in rather small boxes of wood, or if pasteboard be used, these should always be transmitted in wooden boxes, as the eggs are thereby less likely to be broken by a sudden jar or shock. If the nest is sent along, it may contain the eggs belonging to it, each one wrapped in cotton, and the vacancy of the nest filled with the same or other light elastic material. It will be well to pin or tie up each nest in paper to keep it secure, and to prevent entangling of the materials when several are laid together. A temporary box may often be readily constructed of pasteboard, to contain the more delicate or valuable ones.

Whenever practicable, the embryos or young found in the egg should be carefully preserved in alcohol, great care being, of course, taken to mark the specimens properly. The better plan will be to keep each set in a small bottle or vial, and a slip of stiff paper or parchment placed inside with the number or name. Whenever the abundance of the eggs will authorize it, a large number with the young in different degrees of development, even as many as fifty of a kind, should be secured. The embryos in this case need not be removed from the egg, which should, however, be cracked at the blunt end to facilitate the entrance of the spirit. Researches at present in progress relating to the embryology of birds promise results of the highest importance in reference to ornithological classification.

In addition to the nests and eggs of North American birds, skins of some species are wanted by the Smithsonian Institution

for the completion of its ornithological museum, by filling up gaps in the series or by replacing imperfect specimens. Among the large groups of birds, to which attention is invited, are the wandering oceanic species of both the Atlantic and Pacific coasts, such as petrels, shearwaters, guillemots, Mother Carey's chickens, jagers, gulls, terns, etc.; together with the cormorants and grebes, or divers, in their full breeding plumage, as ornamented with linear white feathers, crests, ruffs, etc.

The species of birds most wanted from particular regions are, among others, the following:—

From Florida and the Southeastern U. S.—The flamingo, pink curlew, scarlet ibis, small black hawk (*Rosthramus sociabilis*), a vulture or turkey buzzard with white markings, a blue heron of the largest size with white crest (*Ardea wurdemanni*), the large Florida crow, the small blue jay, etc.

From Texas and New Mexico—Any of the summer resident birds, especially those found on or near the Rio Grande, with their eggs; jays, thrushes, doves, hawks, owls, orioles, black-birds, crows, quails or partridges, the large white whooping or prairie crane (*Grus americana*), etc.

From the Rocky Mountain Regions.—The wild turkey with whitish margin to the feathers of the rump and tail (*Meleagris mexicana*); all the different jays, grouse, pheasants, woodpeckers, black swallows, with or without white throats; the hawks, especially the large black ones.

From the Interior and Northern Portions of the Continent.—The white crane already mentioned, the small geese, the large Canada goose with white extending from the collar down the throat (*Branta leucolema*), the larger trumpeter swan, the rosy gull with black head (*Larus franklinii*), and any other gulls and terns; the white and speckled hawks of the arctic regions, etc.

From the Pacific Coast.—The large California vulture or condor, any hawks, geese, terns, thrushes, magpies, the black oyster catcher, etc.

A pamphlet containing the necessary instructions for preserving birds will be forwarded to any one desiring it, upon application.

JOSEPH HENRY, *Secretary S. I.*

A P P E N D I X.

SINCE the preceding pages were set in type an article has been received from Mr. Alfred Newton, an eminent English oologist, detailing the elaborate methods employed by English collectors of much experience in emptying and preparing eggs for the cabinet. As these methods involve the use of more or less complicated apparatus, which will not be generally procurable by the correspondents of the Institution, the new instructions are commended particularly to the use of those who are forming cabinets for themselves, and are willing to give the time and attention required. All correspondents who propose to collect eggs for the Institution are, however, requested to read carefully Mr. Newton's instructions, and to adopt his suggestions as far as practicable.

JOSEPH HENRY,
Secretary S. I.

SUGGESTIONS
FOR FORMING
COLLECTIONS OF BIRDS' EGGS.

BY ALFRED NEWTON.

GENERAL REMARKS.

THE collecting of birds' eggs for scientific purposes requires far more discrimination than the collecting of specimens in almost any other branch of natural history. While the botanist, and, generally speaking, the zoologist, at home is satisfied as long as he receives the specimens in good condition, with labels attached giving a few concise particulars of when and where they were obtained, it should be always borne in mind that to the oologist such facts, and even the specimens themselves, are of very slight value unless accompanied by a statement of other circumstances which will carry conviction that the species to which the eggs belong has been accurately identified, and the specimens subsequently carefully authenticated. Consequently precision in the identification of his specimens should be the principal object of an egg-collector, to attain which all others must give way. There are perhaps few districts in the world, and certainly no regions of any extent, whose faunas are so well known that the most rigid identification may be dispensed with. Next to identifying his specimens, the most important duty of an egg-collector is to authenticate them by marking them in some manner and on some regular system as will leave no doubt, as long as they exist, of their having been obtained by him, and of the degree of identification to which they were subjected. Neatness in the mode of emptying the shells of their contents, and other similar matters, are much to be commended; they

render the specimens more fitted for the cabinet. But the main points to be attended to, as being those by which science can alone be benefited, are IDENTIFICATION and AUTHENTICATION.

IDENTIFICATION.

Of course the most satisfactory, and often the simplest, way of identifying the species to which a nest of eggs, when found, belongs, is to obtain one of the parents, by shooting, snaring, or trapping. But it sometimes, in practice, happens that this is found to be difficult, from one cause or another—such as the wary instincts of the birds, or the necessities of his position compelling the traveller to lose no time, or the scarcity of the species making him unwilling to destroy the individuals. In any of these cases there is nothing to be done but to make as careful an examination as circumstances will admit of the precise situation of the nest, the materials of which it is composed (supposing that the collector cannot bring it away with him), and accurately to survey the surrounding locality, to observe by what species it is frequented; all the particulars of which examination and survey should be fully noted down at the earliest opportunity possible. Should, however, either or both the birds be killed, they should be skinned, or at least some characteristic part of each preserved,¹ and duly labelled to correspond with the inscriptions subsequently put on the eggs, and *always* with a reference to the collector's journal or note-book, wherein fuller details may be found.

The oologist is especially warned not to be misled by the mere fact of seeing birds around or near the nests. Many of the crow family (*Corvidæ*) are great eaters of eggs, and mistakes are known to have originated from birds of that kind being seen near nests of which they were certainly not the owners. Others, such as the titmice (*Paridæ*), though not plunderers, obtain their food by incessantly seeking it even in the very localities where many

¹ Birds may be preserved *entire* by simply pouring (through a small funnel) a few drops of *pyroligneous acid* down their throats, and saturating the feathers, especially about the vent, with the same fluid; after leaving them to dry for an hour or so, they may be wrapped in paper and packed. (Communicated by Mr. John Hancock.)

species build. It often happens, also, that two different birds have their nests situated very close to one another; and if they be allied species, the collector may be easily deceived. Thus, it has come to the writer's knowledge that the dunlin (*Tringa alpina*) and the purple sandpiper (*Tringa maritima*) have had their nests only a few feet apart. At first a pair of the latter only were seen, which by their actions betrayed their uneasiness. A short search discovered a nest with four eggs. The observer was one of the best practical oologists then living, and his eye at once saw that it was not the nest which he wanted; but a less experienced man would doubtless have immediately concluded that he had found the eggs of the rarer species. Indeed it may, generally speaking, be said of most birds, that whenever they have nests of their own they are also acquainted with those of their neighbors, which by their actions they will often betray to the collector who may be patiently watching them. Birds, again, will occasionally lay their eggs—accidentally, as it were—in the nests of other species, even when they are not of a parasitic nature, as the Old World cuckoos (*Cuculus*, *Eudynamis*, and *Oxylophus*), or the cow blackbird (*Molothrus pecoris*); thus eggs of the eider duck (*Somateria mollissima*) have been found in the nest of a gull (*Larus*), and other similar cases are on record, in some of which, from the species being nearly allied, confusion might easily have arisen, though at the time no doubt may have occurred in the collector's mind.

It would be impossible in this paper to treat of the various methods which may be successfully employed to obtain the birds to whom a nest belongs, and, in fact, these methods can generally be only learned by experience. It is sufficient to indicate here the use of traps, snares, hingles, or bird-lime, in cases where the individuals are too shy to admit of being shot by the gun or rifle. Much may often be gathered by the collector from the practice of the natives, especially if they be savages, or half civilized. In like manner it would too much extend these suggestions to give a detailed account of the different ways in which the nests of birds are to be found. The experience of a single season is to most men worth a whole volume that might be written on the subject. Nevertheless, a few hints are given further on, which might not occur to the beginner.

AUTHENTICATION.

The most complete method of authenticating eggs is that of writing in ink on their shells, not only the name of the species to which each belongs, but also, as far as the space will admit, as many particulars relating to the amount of identification to which the specimen was subjected, the locality where, date when, and name of the person by whom they were taken, *adding always* a reference to the journal or note-book of the collector, wherein *fuller details* may be given. It is advisable to do this on some regular system, and the following method is suggested as one that has already been found to work well in practice. The *scientific* names *only* to be used, except with a mark of doubt or within brackets, when the specimens have *really been satisfactorily identified*; and if the identification has been made by obtaining one or both of the parent birds, a memorandum of the fact to be added, thus: "Both birds snared;" "Bird shot;" or, in smaller space, "Bd. st." If the identification has been effected only by obtaining a good view of the birds, the fact should be stated thus: "Bird well seen," "Bird seen," or "Bd. sn.," as the case may be. For eggs not taken by the collector himself, but brought in by natives, or persons not having a scientific knowledge of ornithology, the *local name* or the *name applied by the finder* should *only* be used, unless indeed it requires interpretation, when the scientific name may be added, but *always within brackets*, thus: "Tooglee-ayah (*Squatarola helvetica*);" the necessary particulars relating to the capture and identification being added. Eggs found by the collector, and *not* identified by him, but the origin of which he has reason to think he knows, may be inscribed with the common English name of the species to which he refers them; or if it has no such appellation, then the scientific name may be used, but in that case *always with a note of interrogation (?)* after it, *or else* the words "Not identified." If the collector prefers it, many of these particulars may be inscribed symbolically or in short-hand, but *never unless* the system used has previously been agreed upon with persons at home, and it be known that they have a key to it. *Each specimen should bear an inscription*; those from the same nest may be inscribed identically; but different nests, especially of the

same or nearly allied species, should never be so marked that confusion can possibly arise. It is desirable to mark temporarily with a *pencil* each egg as it is obtained; but the permanent inscription, which should always be in ink, should be deferred until after the egg has been emptied. The number terminating the inscription in all cases referring to the page of the collector's note-book, wherein full details will be found, and the words or letters preceding the number serving to distinguish between different collectors, no two of whom ought to employ the same. (The initial letter of the collector's name, prefixed to the number, will often be sufficient.)

PREPARATION OF SPECIMENS.

Eggs are emptied, with the least amount of trouble, at *one* hole, which should be drilled in the *side* with such an instrument as shown in the sketches (*figs.* 1, 2, and 3).¹ The hole should, of course, be proportioned to the size of the egg, and the amount of incubation it has undergone. Eggs that are hard set upon are more easily blown by being kept a few days, but the operation must not be deferred too long, or they are apt to burst violently immediately on being punctured, though this may be avoided by holding them under water while the first incision is made. The hole being drilled, the lining membrane should be cleared away from the orifice with a penknife (*fig.* 14), by which means not only is the removal of the contents, but also the subsequent cleansing of the specimen, facilitated. The small end of a blowpipe (*figs.* 4 and 5) should then be introduced, while the other extremity is applied to the mouth, and blown through, *at first very gently*. If the embryo is found to be moderately developed, a stream of water should be introduced by means of a syringe (*fig.* 7), and the egg then gently shaken, after which the blowpipe may be again resorted to, until by the ultimate use of both instruments, aided by scissors (*figs.* 8 and 9), hooks (*figs.* 10, 11, and 12), knives (*figs.* 13, 14, and 15), and forceps (*fig.*

¹ The great object to be attained is the formation of a *circular* hole with *smooth edges*. Collectors not having such a drill as is here recommended, will find a common *nail* or a three-cornered needle a useful substitute, but they must be used with extreme care.

16), the contents are completely emptied. After this the egg should be filled with water from the syringe, gently shaken, and blown out, which process is to be repeated until its interior is completely cleansed, when it should be laid upon a pad of blotting-paper or fine cloth, with the hole downwards, its position on the pad or cloth being occasionally changed, until it is perfectly dry. During this time it should be kept as much as possible from the light, especially from the sunshine, as the colors are then more liable to fade than at any subsequent time. In the case of very small eggs, when fresh, the contents may be sucked out by means of a bulb tube (*fig. 6*), and the interior afterwards rinsed out as before. It is always advisable, as far as possible, to avoid wetting the outside of the shell, as the action of water is apt to remove the "bloom," affect the color, and in some cases alter the crystallization of the shell. Consequently dirt stains or dung spots should never be removed. While emptying the contents, it is as well to hold the egg over a basin of water, to avoid breakage in case of its slipping from the fingers. Eggs that are very hard sat upon, of whatever size they be, should be treated in the manner detailed in the accompanying "Description of Egg-blowing Instruments," under the head of "*fig. 17*," which is a method superior to any other known at present to the writer for preventing injury arising to them. Should the yelk of the egg be dried up, a small portion of *carbonate of soda* may be introduced (but with great care that it does not touch the outer surface of the shell, in which case the color is likely to be affected), and then the egg filled with water from the syringe, and left to stand a few hours with the hole uppermost, after which the contents are found to be soluble, and are easily removed by the blowpipe, assisted by one of the hooks. It is almost unnecessary to add, except for the benefit of beginners, that the manipulation of the different instruments requires extreme caution, but a few trials will give the collector the practice necessary for success. Those who may still prefer to blow eggs by means of *two* holes are *particularly requested not to make them at the ends of the eggs, nor at opposite sides*, but on the same side. (*fig. 18*.) In this case the hole nearest the smaller end of the egg should be the smallest, and the contents blown out at the other. If the holes are made at the *ends* of the eggs, it not only very much injures their appearance as cabinet specimens,

but also prevents their exact dimensions from being ascertained accurately; and if they are made at *opposite sides*, the extent of the "show surface" is thereby lessened. Eggs should never be written on until the shells are perfectly dry, or the ink will be found to run, and the inscription will be rendered illegible. Eggs with chalky shells, such as those of the anis (*Crotophaga*), gannets and cormorants (*Pelecanidæ*), and others, may be conveniently marked by incising with a pin or the point of an egg-drill, so also those of the ptarmigans (*Lagopus*), care being taken in this case to select the dark-colored patches to write upon. The inscriptions should always be placed on the same side as the hole or holes, and confined within the smallest limits possible. For drilling the hole or holes the side presenting the least characteristic markings should be selected.

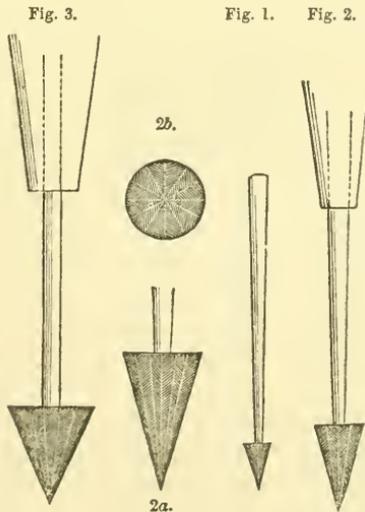
CONCLUDING OBSERVATIONS.

The best allies of the collector are the residents in the country, whether aboriginal or settlers, and with them he should always endeavor to cultivate a close intimacy, which may be assisted by the offer of small rewards for the discovery of nests or eggs. He should, however, always insist upon any nests found being shown to him *in situ*, and the gratuities paid should be proportioned to his success in identifying the species to which they belong. He should steadily refuse any but the most trifling remuneration for nests or eggs taken and brought to him. As a rule, the eggs of the different species of plovers and sandpipers (*Charadriidæ* and *Scolopacidæ*) are those most wanted by oologists of all countries. These birds mostly breed in high northern latitudes, but they often choose elevated spots for nesting in more southern parallels. Their nests are nearly always difficult to find, even when the birds are discovered. Their habit is, if the ground be at all rough with herbage, to run off the nest for some distance before taking wing, as the observer approaches; if the ground be bare, they will try to escape observation by squatting closely until they are almost trodden upon. The best method of finding them, and indeed the nests of some other species, is for the collector to conceal himself near the place where he has reason to believe the eggs are, and to endeavor to watch the bird as she returns to her nest—using a telescope, if neces-

sary; but should this fail, after giving her time to settle herself upon it, to fire off a gun suddenly, or spring up and shout, when the bird, in her surprise, will often at once take wing from the nest, or at least without running many yards. To reach the nests of rock-building birds, a man or boy can be lowered by a rope from the top, when it is accessible. The rope should *always be tied under the arms* of the person lowered, as substances, detached from above by the friction of the rope, may, by falling on him, stun him for a moment, and cause him to lose his hold. But in all places and at all times an egg-collector should recollect that IDENTIFICATION and AUTHENTICATION are his *main objects, to attain which no trouble is too laborious, no care too great.*

DESCRIPTION OF EGG-BLOWING IMPLEMENTS.

Figs. 1, 2, and 3, represent "drills" for making neat and circular holes in the shell. These drills should be made of the best



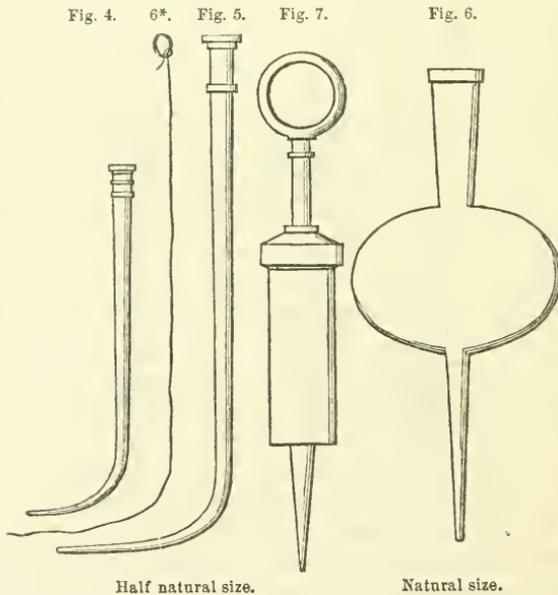
Figs. 1, 2, 3, natural size. Figures 2a, 2b, enlarged

steel that can be procured, and of different sizes. *Fig. 1* is meant for the smallest eggs, even humming bird's, up to those

say of a robin (*Turdus migratorius*). The grooves forming the drilled surface should be cut with a *chisel*. *Fig. 2* will suit the generality of eggs, excepting those of very large birds and of sea fowl, which usually lay eggs with a strong but soft shell. The grooves may be cut either with a *chisel* or a *file*, but if with the latter, greater care will be requisite in its use. *Fig. 3* is intended for the largest eggs, and even some of the smaller ones which have a chalky shell, such as *Crotophaga*. The grooves are cut with a *file*. In the manufacture of all these drills the greatest care is necessary that the grooves should lie *parallel to one another*, and that their *edges should be smooth*. The smaller the drill, the more acute should be the angle it forms at the point. The drills may be fitted with handles or not according to fancy. Those with handles are less likely than the others to cramp the fingers of the performer, an inconvenience which often causes breakages.

N. B. A separate sketch is given with the *enlarged* views of the end of a drill, in order to show more plainly the manner in which the grooves should be cut.

Figs. 4 and 5 represent blowpipes, for emptying eggs. They



are best made of metal, and for this purpose nickel (or German silver) is preferable, as being less liable to rust. A collector should have two sizes, as a large size is not convenient for small eggs, and a small one causes loss of time in blowing large eggs. They should be made as light as possible, or they may slip from the mouth and break the egg being operated on. The chief point to be attended to in their construction, is that the lower orifice should be as *large* as the size of the pipe permits. It is of course necessary that they should be perfectly smooth outside, towards the lower end. They may be straight, although the curve is preferable.

Fig. 6 represents a tube for emptying small eggs by suction. The bulb is to receive the contents of the egg and prevent them from reaching the mouth of the operator and thus causing nausea. This instrument is best made of thin glass, as thereby it can be easily kept clean. The same remark applies to this as to the last, with respect to the size of the lower orifice.

N. B. A piece of thin wire (*fig. 6**), long enough to pass entirely through the tubes, should be always kept at hand by the operator, to remove obstructions which are likely to occur from small pieces of the embryo, or half-dried yelk, being accidentally drawn into the tubes or blowpipes.

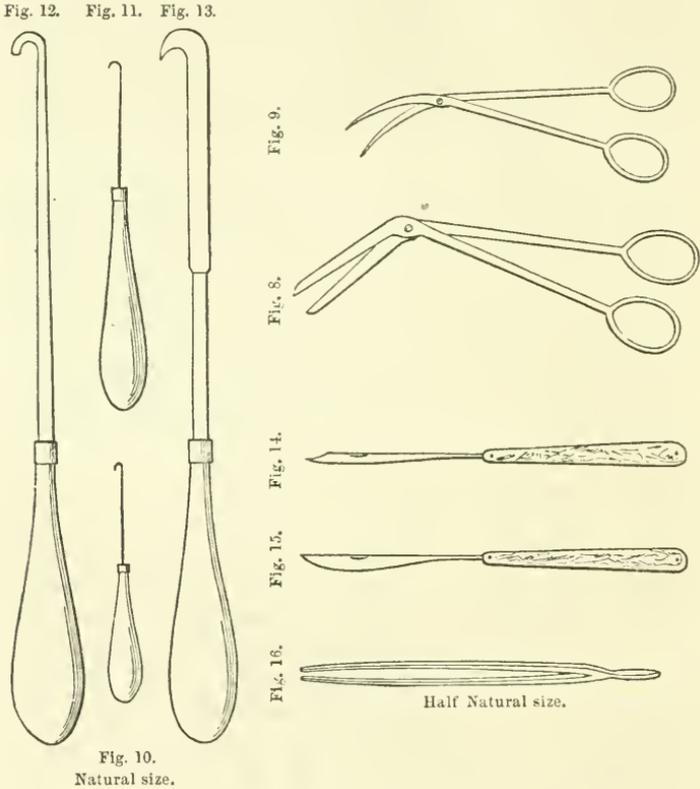
Fig. 7 represents a syringe, which will be found useful in rinsing out the inside of an egg. It may be made of any metal, though the pewter ones are apt, from their weight, to be clumsy. Nickel is recommended, as for the common blowpipes. The lower orifice should be as large as possible. The ring at the top should be large enough for the insertion of the operator's right thumb—as it must be remembered that he has to work it with one hand. The nozzle, as shown in the figure, is rather too tapering. It should be smaller in proportion at the upper end.

Figs. 8 and 9 represent scissors of shapes likely to be found very useful. *Fig. 8* for cutting through the bones of the embryo *before it is extracted*, and *fig. 9*, for cutting off portions of it, *while it is being extracted* by one of the hooks represented in—

Figs. 10, 11, and 12, which should vary in size from that of an ordinary pin to that of stout wire. The length of their straight portions should be rather more than the diameter of the egg they are used on.

Fig. 13 represents a knife with a crooked blade, somewhat like a bill-hook, and may be useful in cutting up the embryo prior to extraction.

Figs. 14 and *15* represent a penknife and scalpel with elongated blades, or shafts, to admit of their being introduced into

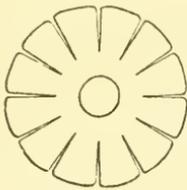


the egg to cut up the embryo. *Fig. 14* is also, perhaps, the best instrument with which to remove the lining membrane from the hole. This is done by inserting the blade perpendicularly and slightly scraping the edge of the hole, as soon as it is drilled.

Fig. 16 represents a forceps for extracting the pieces of the embryo when cut up. The spring should not be too lively, as its resiliency may occasion breakage. The grasping surfaces should be *roughed* to prevent the pieces slipping.

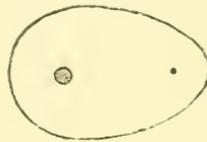
Fig. 17 shows a piece of paper, a number of which when gummed on to an egg, one over the other, and left to dry, strengthen the shell in such a manner that the instruments above described can be introduced through the aperture in the middle and worked to the best advantage, and thus a fully formed embryo may be cut up, and the pieces extracted through a very moderately sized hole; the number of thicknesses required depends of course greatly upon the size of the egg, the length of time it has been incubated, and the stoutness of the shell and the paper. Five or six is the least number that it is safe to use.

Fig. 17.



Natural size.

Fig. 18.



Each piece should be left to dry before the next is gummed on. The slits in the margin cause them to set pretty smoothly, which will be found very desirable; the aperture in the middle of each may be cut out first, or the whole series of layers may be drilled through when the hole is made in the egg. For convenience sake the papers may be prepared already gummed, and moistened when put on (in the same way that adhesive postage labels are used). Doubtless, patches of linen or cotton cloth would answer equally well. When the operation is over, a slight application of water (especially if warm), through the syringe, will loosen them so that they can be easily removed, and they can be separated from one another and dried to serve another time. The size represented in the sketch, is that suitable for an egg of moderate dimension, such as that of a common fowl.

Observations —The most effectual way of adopting this method of emptying eggs, is by using *very many layers of thin paper and plenty of thick gum*, but this is of course the most tedious. Nevertheless, it is quite worth the trouble in the case of really rare specimens, and they will be none the worse for operating upon from the delay of a few days, caused by waiting for the

gum to dry and harden. The naturalist to whom this method first occurred, has found it answer remarkably well in every case that it has been used, from the egg of an eagle to that of a humming bird, and among English oologists it has been generally adopted.

SMITHSONIAN MISCELLANEOUS COLLECTIONS.

C I R C U L A R

IN REFERENCE TO THE

HISTORY OF NORTH AMERICAN GRASSHOPPERS.

THE Smithsonian Institution, being desirous of obtaining accurate information respecting the Grasshopper¹ tribes of North America, calls the attention of its friends and correspondents to a number of queries relative to this subject, drawn up by Mr. P. R. Uhler.

It is well known that these insects destroy immense quantities of the products of the fields; while there is scarcely a plant that is not at times subjected to their ravages.

With these facts in view, and in consideration of the want of material to complete their history, the Institution respectfully requests attention to the subjoined questions. Answers may be returned by reference merely to the numbers.

Should there be several species of grasshoppers committing their depredations in any one locality, the queries should be answered separately for each.

In all cases, whenever practicable, full series of each species observed should be collected and preserved in a bottle or vial filled with alcohol, or strong spirit of some kind. If this cannot be obtained, the grasshoppers may be dried. Care should be taken to indicate the locality, date, and collector of each series. These may be transmitted to the Institution by any convenient opportunity. The answers to the queries may be sent to the Institution, either direct or under cover to the U. S. Commissioner of Patents.

¹ The grasshoppers of North America correspond to the locusts of the old world, which commit such ravages in Asia and Africa. The term locust is applied in America to a widely different insect, not here under consideration.

1. When does the Grasshopper lay its eggs?
2. How does it lay its eggs? With the ovipositor projected at the time into the ground, or into a hole dug beforehand?
3. At what depth does the female deposit her eggs?
4. What kind of soil does she prefer for this purpose?
5. What localities, whether near streams, on hill-sides, in pits, or in cavities?
6. How often does she lay her eggs?
7. How long does she live after laying them?
8. Does she lay them singly or in clusters?
9. Does she sometimes lay them singly, and at other times in clusters?
10. What do the eggs resemble?
11. What is their size? shape? color? markings?
12. How much time is occupied in laying the eggs?
13. What changes take place in the egg before it is hatched?
14. How long does the egg remain before it is hatched?
15. What state of the atmosphere is most favorable for its development?
16. How does the young escape from the egg?
17. What is its appearance? marking? size?
18. What places and food does it prefer?
19. Is it capable of producing noise, and how?
20. What is its general manner of life?
21. Does it exhibit any peculiar actions?
22. Is it ever pugnacious, or destructive of its own or other kind of insects?
23. When does its first change of skin occur?
24. What peculiarities does it then exhibit?
25. How long a time is occupied in changing the skin?

26. How many changes of the skin occur?
27. What are its peculiarities after each change?
28. What length of time between each change?
29. How long after its exclusion from the egg does its last moult occur?
30. What is the appearance of the pupa?
31. Does it change its skin?
32. When and how often does it moult?
33. Does it ever feed while moulting?
34. Does it change its food after moulting?
35. What changes take place in its habits or manners?
36. What remarkable appearance does it ever present?
37. When does it become full winged?
38. Does it ever moult after becoming full winged?
39. What changes in habits or manners then occur?
40. What comparative difference is there in the sizes of the sexes?
41. When does the male unite, sexually, with the female?
42. What is the length of time required for the act?
43. What peculiarities are observed at this time?
44. How much time elapses between this act and the laying of the eggs?
45. How long does the male live after the act?
46. How long does the female live after laying the eggs?
47. Does the female ever make a noise, and how?
48. How does the male produce his note?
49. At what times is he most noisy?
50. What variations of instinct have been remarked in either sex?
51. What condition of the atmosphere seems most favorable for their increase?

52. What other physical conditions favor them ?
53. What physical conditions are most unfavorable to them ?
54. What physical or other conditions cause them to migrate ?
55. How far has their migratory flight been known to extend ?
56. What times do they prefer for migrating ?
57. What vegetable or other substances are repugnant to them and what do they prefer ?
58. Do odors of any kind affect them in any particular way ?
59. Through how extended a district have their ravages been noticed ?
60. What remedies have been used to prevent their ravages ?
61. How far has each remedy been successful ?

A very small amount of time appropriated to observing these insects may bring about results of the most weighty importance. It is useless to attempt to prevent the destruction occasioned by any species of insect until a sufficient acquaintance with its economy is effected, and it is matter of much regret that, generally, so little is known respecting the insects of this country ; a little exertion, well directed, will do much in obtaining correct information respecting them, and millions of dollars' worth of property be saved to the agriculturist every year.

Hoping that the zeal which has been so often displayed by the coadjutors of the Institution, in other departments of science, may be awakened in behalf of the important subject here presented, it makes this appeal, feeling assured that the assistance so much needed will be freely afforded.

JOSEPH HENRY,

Secretary of the Smithsonian Institution.

SMITHSONIAN INSTITUTION, *January 1, 1860.*

SMITHSONIAN MISCELLANEOUS COLLECTIONS.

C I R C U L A R

IN REFERENCE TO COLLECTING

NORTH AMERICAN SHELLS.

THE Smithsonian Institution contemplates the preparation of a series of Reports upon the Shells of North America, with particular reference to their geographical distribution; and takes this occasion to invite the coöperation of its correspondents and the friends of science generally, in collecting materials for this purpose, as well as in completing the conchological department of its museum and furnishing materials for its home and foreign exchanges. Due acknowledgment will be made for any such assistance, and a copy of the Reports presented to contributors, as well as a labelled series of their specimens returned, if desired.

The Institution is desirous to receive even the commonest shells, and in large numbers, for the purposes of exchange.

Any collections of shells or other objects of Natural History may be sent to the care of the Adams Express Company in the eastern part of the continent, and on the west coast to the care of Forbes & Babcock, San Francisco, Cal., by whom they will be forwarded to the Institution.

The following instructions based upon the experience of several practised collectors, have been presented to the Smithsonian Institution as containing the information necessary to attain the object in view.

JOSEPH HENRY, *Secretary S. I.*

SMITHSONIAN INSTITUTION, Jan. 1st, 1860.

SPECIAL INSTRUCTIONS.

The shells most wanted for the purposes in view are, in the first place, all the species of the western portion of the continent, the land and freshwater, and especially the marine shells of the Pacific; next the marine shells of the eastern coast, and of the Gulf of Mexico, including the West India Islands; next the land and freshwater univalves generally, with the *Cycladidæ*; and lastly, as best known, the *Unionidæ* or Mussels, especially those of the regions west of the Mississippi, and the southern Atlantic and Gulf States.

Wherever practicable, a full series of the shells of each locality, with their animals enclosed, should be preserved in alcohol; in the case of the smaller species, it will be well to throw in spirit all that can be collected, as much trouble in cleaning will thereby be saved. Shells with their animals are of much more value for scientific investigations than those without them, and should be carefully sought after. Dead shells, however, or those picked up on the beach or elsewhere, without any animal attached or included, should also be collected in large numbers, even when the same kinds are preserved in alcohol, as showing forms or variations not seen in the other series, or as increasing the aggregate of material for the investigation of the species.

As a general rule, the alcohol used should not be very strong—about fourth proof is the best. The shells, especially the diminutive ones, should be kept in small lots, and not mixed with vertebrates or crustaceans (which require stronger spirit), if it can be avoided. Small bottles, jars, or tin cans may be employed for the purpose. Shells without their animals should be preserved dry, and not thrown into spirit.

In packing shells for transportation, care should be taken to have the bottle or box in which they are contained perfectly full, to prevent friction during transportation. The larger ones should be wrapped separately in paper.

When it is inconvenient to transport shells containing their animals in alcohol, after having been immersed in this fluid, they may be taken out and the animals allowed to dry up. They can at any time be relaxed again for examination by soaking in a solution of strong potassa—although it is best to keep them in

the spirit whenever practicable; for this purpose a strong spirit should be diluted, else the animal is hardened and the shell damaged.

The animal may be best killed and removed from the shell by immersing in *boiling* water, and allowing it *gradually* to cool. This will loosen its muscular attachments, when it can be readily extracted, in most cases whole.

It is perhaps unnecessary to say that the value of shells in reference to indications of geographical distribution, will depend entirely upon the accuracy of their labels of station and locality. The greatest care should always be taken to mark down the locality at the time of collecting, if on a journey, and to verify as far as possible all statements in respect to this point relating to specimens obtained from others. Specimens received from other sources should always be packed and labelled separately from those obtained by the collector.

The west coast abounds in Limpets. These are found adhering to rocks at low water. Some are only seen at the ebb of spring tides; others live adhering to the fronds and stems of kelp, some being extremely small. The animals of all these should be preserved; and, as they drop out of the shells in spirit, each kind should be tied up separately. There are several slipper limpets (*Crepidulidæ*) and key-hole limpets (*Fissurellidæ*) to which attention is requested. They generally live attached to other shells. There is a very large species in which the shell is almost hidden (*Lucapina crenulata*), which should be always preserved in spirit. The *Chiton* tribe (woodlouse shells) deserve special attention. As they are apt to roll up into a ball, they should be tied flat to a strip of wood on being taken off the rock, and then immersed in spirit. A large species, in which the shelly plates are quite hidden, and the animal looks like a leathery lump, should be specially sought after. The animals of the great Ear Shells (*Haliotis*) should also be preserved in spirits. Of these and of the Limpets, and indeed of all shells, it is very desirable to collect individuals *of all ages*, especially of the youngest. If they be found in spawning season, the eggs should be preserved in spirit.

Special attention should be given to the Top Shells (*Trochidæ*) which, with all other univalve shells, should be carefully preserved with their *opercula*, or horny (sometimes shelly) lid on the mouth.

After a storm, the kelp and shore should be carefully searched for these and other shells.

The rocks and hardened mud banks should be searched for bivalves, which bore in them, and must be extracted by the hammer. They should be preserved in spirit. Some kinds make a cup or shelly tube outside the shell, which should be preserved. Most of the bivalves are found in the sand or sandy mud, and should be dug for where a little rising, or holes are seen. Salt marshes are particularly productive.

Most of the kinds can only be obtained alive by dredging,¹ especially on a bottom of sandy mud or gravel. But several rare deep-water species can be obtained by examining the contents of fishes' stomachs and intestines, where they are often found in quantities uninjured.

Some of the most interesting shells are extremely small. They may be picked off from the kelp or crevices of rocks at low water; and if there be sand, mud, or small gravel, especially from deep water, which contains small and broken shells, the larger shells may be packed up in it with advantage, after passing it through a fine sieve.

Land shells should be sought for in rainy weather, and in the early morning. The small kinds are often found on decayed bark or under stones. The naked slugs (as well as similar animals in the sea) should be preserved in spirit. The freshwater univalves will be found on stones, buried in mud, or among water plants; and the pond and river mussels at the bottom. None of the land or freshwater shells of the Pacific coast are as yet common in collections.

All information as to the station and habits of each species will be very acceptable. If they be kept in water (changing it constantly) and the animal drawn when in motion, very important knowledge may be gained.

The shells should be left with the dirt and all natural secretions adhering to them; nor should filing, acid, etc., on any account be employed with a view to improve their appearance.

¹ A figure of the dredge, and instructions for its use, will be found on page 39 of "Directions for making Collections of Natural History," published by this Institution. The pamphlet will be sent to any one desiring it, on application.