

MANUAL OF INSTRUCTION  
AND



CHECK-LIST OF THE BIRDS

NORTH AMERICA







Prof. S. F. Baird

With kindest regards of

Shelton Jones



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Birds

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# FIELD ORNITHOLOGY.

COMPRISING A

## MANUAL OF INSTRUCTION

FOR

### PROCURING, PREPARING AND PRESERVING BIRDS,

AND A

### Check List of North American Birds.

BY

DR. ELLIOTT COUES, U. S. A.



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CHECK LIST.

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# MANUAL OF INSTRUCTION,

AND

## CHECK LIST OF THE BIRDS OF NORTH AMERICA.

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### PRELIMINARY AND EXPLANATORY.

BOTH author and publisher of the "Key to North American Birds" intended that the work should contain instructions for collecting and preparing birds, and that a CHECK LIST, according with the author's views, should appear simultaneously with the volume. This proved impracticable: partly because the work so far overran the original estimates, that the additional expense and risk, which the publisher, an accomplished naturalist, generously offered to assume, seemed to the author unjustifiable; and partly because the writer's unexpected call to another field of official duty suddenly threw such a pressure of other engagements upon his hands that he could not just then find time to write out even so slight a treatise as this. The CHECK LIST and MANUAL OF INSTRUCTION are therefore now presented together, as a Supplement to the Key.

The demand for a new CHECK LIST has become urgent. The last one published, and only one now in use, expresses a former state of American ornithology. That great changes—presumably for the better—have lately been made, is shown by the fact that, in round numbers, fifty species have been

since ascertained to inhabit North America, while one hundred and fifty have been removed from the former list as being extralimital, invalid or otherwise untenable. Of whatever part the author may have taken in remodelling the list, it would be obviously indelicate to speak. But he cannot refrain from alluding to the signal services of reform rendered by Mr. Allen, of Cambridge, whose stanch advocacy, under circumstances that might have excused flinching, did so much to precipitate the changes, long while progressing and inevitable, for which the time was at length at hand. Nor would this allusion be entirely just, did he not in the same connection refer to the thorough revision now making by Prof. Baird himself, with the coöperation of Dr. Brewer and Mr. Ridgway, the results of which are about to appear in what promises to be one of the greatest monuments ever erected to American ornithology. The notable concordance of the several writings in question, an agreement the more gratifying because a short time since it might have been considered impossible, marks an important period in the history of the science. The outlook promises well, when different premises lead up to the same conclusions, and conflicting views are reconciled.

The present CHECK LIST, prepared in strict accordance with the KEY, reflects exactly whatever of truth or error that work represents. The typography and presswork render it susceptible of use in labelling a collection.\* It shows mainly three points of disagreement with the current Smithsonian List. The number of genera is reduced though not to the extent that may be desirable. It is perhaps to be regretted, that so many needless and burdensome generic names, for which Bonaparte, Cabanis, Kaup and Reichenbach are largely re-

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\* For this purpose the LIST will be issued as a pamphlet by itself as well as forming part of this little volume.

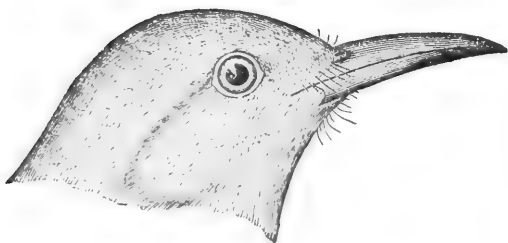
sponsible, were adopted in Prof. Baird's great work;\* for, sanctioned by the usage of such eminent authority, they have passed current, and are too closely ingrained in our nomenclature to be soon eradicated. The writer feels at liberty to speak plainly, for his own skirts are not clear. Secondly, not a few species, new to North America, or to science, or both, have of late years been ascertained to inhabit this country. The third and principal variance between the present CHECK LIST and its predecessor results from a large reduction of the number of admitted species. Part of them are excluded simply because extralimital; but most because they are considered untenable as species. In the present state of our knowledge, and under a system of nomenclature that is proven inadequate and may before long become obsolete, recognition of numerous "Varieties"—resultant modifications of species by physical conditions of environment—is imperative; and what are these varieties but the rills that flow into and help to swell the mighty stream of descent with modification?

The Instructions for Collecting and Taxidermy, herewith offered, are drawn almost entirely from the writer's experience, acquired during several years he has spent, with little interruption, in the study of our birds. He has collected over a wide area from Labrador to California, in northwestern territories, and in several southern states; enjoying opportunities for field investigations that no one with the least taste or aptitude for the pursuit could fail to profit by. In the matter of collecting, therefore, he may reasonably venture to speak with confidence. Since, furthermore, a taxidermal process that has been repeated several thousand times with fair results is by this simple circumstance proven satisfactory, he feels no diffi-

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\*"Birds of North America" by Baird, Cassin and Lawrence.

dence in presenting his method as a model to be followed in the absence of a better one. The Instructions will, it is believed, enable any one to become reasonably proficient in certain of the indispensable qualifications of a good working ornithologist. He intends to take what may or may not be a liberty, and to presume that the reader is entirely inexperienced in field-work; and he begs the further privilege of waiving formality, that he may be allowed to address the reader very familiarly, much as if chatting with a friend on a subject of mutual interest.



Bendire's Mocking-thrush. *Harporhynchus Bendirei* Coues.  
See American Naturalist for June, 1873, vol. vii, p. 330.

# MANUAL OF INSTRUCTION.

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## CHAPTER I.

### IMPLEMENTS FOR COLLECTING, AND THEIR USE.

§1. THE DOUBLE-BARRELLED SHOT GUN is your main reliance. Under some circumstances you may trap or snare birds, catch them with bird-lime, or use other devices; but such cases are exceptions to the rule that you will shoot birds, and for this purpose no weapon compares with the one just mentioned. The soul of good advice respecting the selection of a gun, is, *get the best one you can afford to buy*; go the full length of your purse in the matters of material and workmanship. To say nothing of the prime requisite, safety, or of the next most desirable quality, efficiency, the durability of a high-priced gun makes it cheapest in the end. Style of finish is obviously of little consequence, except as an index of other qualities; for inferior guns rarely, if ever, display the exquisite appointments that mark a first-rate arm. There is really so little choice among good guns that nothing need be said on this score; you cannot miss it if you pay enough to any reputable maker or reliable dealer. But collecting is a specialty, and some guns are better adapted than others to your particular purpose, which is the destruction, as a rule, of small birds, at moderate range, with the least possible injury to their plumage. Probably three-fourths or more of the birds of a miscellaneous collection average under the size of a pigeon, and were shot within thirty yards. A *heavy* gun is therefore unnecessary, in fact ineligible, the extra weight being useless. You will find a gun of  $7\frac{1}{2}$  to 8 pounds weight most suitable. For similar

## 6 IMPLEMENTS FOR COLLECTING, AND THEIR USE.

reasons the *bore* should be small; I prefer 14 gauge, and should not think of going over 12. To judge from the best sporting authorities, *length of barrel* is of less consequence than many suppose; for myself, I incline to a rather long barrel — one nearer 33 than 28 inches — believing that such a barrel *may* throw shot closer; but I am not sure that this is even the rule, while it is well known that several circumstances of loading, besides some almost inappreciable differences in barrels, will cause guns apparently exactly alike to throw shot differently. Length and crook of *stock* should of course be adapted to your figure—a gun may be made to fit you, as well as a coat. For wild-fowl shooting, and on some other special occasions, a heavier and altogether more powerful gun will be preferable.

§2. BREECH-LOADER *vs.* muzzle-loader, a case long argued, may be considered settled in favor of the former. Provided the mechanism and workmanship of the breech be what they should there are no valid objections to offset obvious advantages, some of which are these: ease and rapidity of loading, and consequently delivery of shots in quick succession; facility of cleaning; compactness and portability of ammunition; readiness with which different sized shot may be used. This last is highly important to the collector, who never knows the moment he may wish to fire at a very different bird from such as he has already loaded for. The muzzle-loader must always contain the fine shot with which nine-tenths of your specimens will be secured; if in both barrels, you cannot deal with a hawk or other large bird with reasonable prospects of success; if in only one barrel, the other being more heavily charged, you are crippled to the extent of exactly one-half of your resources for ordinary shooting. Whereas, with the breech-loader you will habitually use mustard-seed in both barrels, and yet can slip in a different shell in time to seize most opportunities requiring large shot. This consideration alone should decide the case. But, moreover, the time spent in the field in loading an ordinary gun is no small item; while



cartridges may be charged in your leisure at home. This should become the natural occupation of your spare moments. No time is really *gained*; you simply change to advantage the time consumed. Metal shells, charged with loose ammunition, and susceptible of being reloaded many times, are preferable to paper cartridges, even such as you load yourself, and are far more eligible than any special fixed ammunition which, once exhausted in a distant place, and circumstances may upset the best calculations on that score, leaves the gun useless. On charging the shells mark the number of the shot used on the outside wad; or better, use colored wads, say plain white for dust shot, and red, blue and green for certain other sizes. If going far away take as many shells as you think can possibly be wanted and then add a few more.

§3. OTHER WEAPONS, ETC. An ordinary *single-barrel* gun will of course answer but is a sorry makeshift, for it is sometimes so poorly constructed as to be unsafe,\* and can at best be only just half as effective. The *cane-gun* should be mentioned in this connection. It is a single-barrel, lacquered to look like a stick, with a brass stopper at the muzzle to imitate a ferule, counter-sunk hammer and trigger, and either a simple curved handle, or a light gunstock-shaped piece that screws in. The affair is easily mistaken for a cane. Some have acquired considerable dexterity in its use; my own experience with it is very limited and unsatisfactory; the handle always hit me in the face, and I generally missed my bird. It has only two recommendations. If you approve of shooting on Sunday and yet scruple to shock popular prejudice, you can slip out of town unsuspected. If you are shooting where the law forbids destruction of small birds—a wise and good law that you may sometimes be inclined to defy—artfully careless handling of the deceitful implement may prevent arrest and fine. A *blow-gun* is sometimes used. It is a long slender tube of wood, metal or glass, through which clay-balls, tiny arrows,

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\*This remark does not apply to any of the fine single-barrelled breech-loaders now made.

etc., are projected by force of the breath. It must be quite an art to use such a weapon successfully, and its employment is necessarily exceptional. Some uncivilized tribes are said to possess marvellous skill in the use of long bamboo blow-guns; and such people are often valuable employés of the collector. I have had no experience with the noiseless *air-gun*, which is, in effect, a modified blow-gun, compressed air being the explosive power. Nor can I say much of various methods of *trapping* birds that may be practised. On these points I must leave you to your own devices, with the remark that horse-hair *snares*, set over a nest, are often of great service in securing the parent of eggs that might otherwise remain *unidentified*. I have no practical knowledge of *bird-lime*; I believe it is seldom used in this country. A method of *netting* birds alive, which I have tried, is both easy and successful. A net of fine green silk, some 8 or 10 feet square, is stretched perpendicularly across a narrow part of one of the tiny brooks, overgrown with briars and shrubbery, that intersect many of our meadows. Retreating to a distance the collector beats along the shrubbery making all the noise he can, urging on the little birds till they reach the almost invisible net and become entangled in trying to fly through. I have in this manner taken a dozen sparrows and the like at one "drive." But the gun can rarely be laid aside for this or any similar device.

§4. AMMUNITION. The best *powder* is that combining strength and cleanliness in the highest compatible degree. In some brands too much of the latter is sacrificed to the former. Other things being equal, a rather coarse powder is preferable, since its slower action tends to throw shot closer. Some numbers are said to be "too quick" for fine breech-loaders. Inexperienced sportsmen and collectors almost invariably use too coarse *shot*. When unnecessarily large, two evils result: the number of pellets in a load is decreased, the chances of killing being correspondingly lessened; and the plumage is unnecessarily injured, either by direct mutilation, or by subsequent bleeding through large holes. As already hinted, shot

cannot be too fine for your routine collecting. Use "mustard-seed," or "dust-shot," as it is variously called; it is smaller than any of the sizes usually numbered. As the very finest can only be procured in cities, provide yourself liberally on leaving any centre of civilization for even a country village, to say nothing of remote regions. A small bird that would have been torn to pieces by a few large pellets, may be riddled with mustard-seed and yet be preservable; moreover, there is, as a rule, little or no bleeding from these minute holes, which close up by the elasticity of the tissues involved. It is astonishing what large birds may be brought down with the tiny pellets. I have killed hawks with such shot, knocked over a wood ibis at forty yards and once shot a wolf dead with No. 10, though I am bound to say the animal was within a few feet of me. After dust-shot, and the nearest number or two, No. 8 or 7 will be found most useful. Waterfowl, thick-skinned sea birds like loons, cormorants and pelicans, and a few of the largest land birds, require heavier shot. I have had no experience with the substitution of fine gravel or sand, much less water, as a projectile; besides shot I never fired anything at a bird except my ramrod, on one or two occasions, when I never afterwards saw either the bird or the stick. The comparatively trivial matter of *caps* will repay attention. Breech-loaders not discharged with a pin take a particular style of short cap called a "primer;" for other guns the *best* water-proof lined caps will prevent annoyance and disappointment in wet weather, and may save you an eye, for they only *split* when exploded; whereas, the flimsy cheap ones—that "G D" trash, for instance, sold in the corner grocery at ten cents a hundred—usually fly to pieces. Moreover, the top of such a cap is sometimes driven into the nipple. Using Ely's caps, I shot a whole season in the fog and rain of Labrador, without a single miss-fire, though my gun was sometimes dripping. Cut felt *wads* are the only suitable article. Ely's "chemically prepared" wadding is the best. It is well, when using plain wads, occasionally to drive a greased one through the barrel. Since you may sometimes run out of wads through an unexpected contin-

## 10 IMPLEMENTS FOR COLLECTING, AND THEIR USE.

gency, always keep a wad-cutter to fit your gun. You can make serviceable wads of pasteboard, but they are far inferior to felt. Cut them on the flat sawn end of a stick of fire-wood; the side of a plank does not do very well. Use a wooden mallet, instead of a hammer or hatchet, and so save your cutter. Soft paper is next best after wads; I have never used rags, cotton or tow, fearing these tinder-like substances might leave a spark in the barrels. Crumbled leaves or grass will answer at a pinch. I have occasionally, in a desperate hurry, loaded and *killed* without any wadding.

§5. OTHER EQUIPMENTS.\* a. *For the gun.* A gun-case will come cheap in the end, especially if you travel much. The usual box, divided into compartments, and well lined, is the best, though the full length leather or india-rubber cloth case answers very well. The box should contain a small kit of tools, such as mainspring-vise, nipple-wrench, screw-driver, etc. A stout hard-wood cleaning rod, with wormer, will be required. It is always safe to have parts of the gun lock, especially mainspring, in duplicate. For muzzle-loaders extra nipples and extra ramrod heads and tips often come into use. For breech-loaders the apparatus for charging the shells is so useful as to be practically indispensable. b. *For ammunition.* Metal shells or paper cartridges may be carried loose in the large lower coat pocket, or in a leathern satchel. There is said to be a chance of explosion by some unlucky blow, where they are so carried, but I never knew of an instance. Another way is to fix them separately in a row in snug loops of soft leather sewn continuously along a stout waist-belt; or in several such horizontal rows on a square piece of thick leather, to be slung by a strap over the shoulder. The appliances for loose ammunition are almost endlessly varied, so every one may con-

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\* Parker Brothers, West Meriden, Conn., publish a pamphlet which I should advise you to get. I suppose it would be mailed on application. It is of course entirely in the business interest of the Parker gun, but gives many useful hints of general practical applicability, respecting the appliances for guns and ammunition. There is a good deal of apparatus that I pass over as not being indispensable, but which you might find convenient.

sult his taste or convenience. The shot-pouch I had settled upon before using a breech-loader, as the most satisfactory is the "double-barrelled" one, so to speak, that buckles round the waist, and is further supported by shoulder-straps crossing on the back exactly like a pair of suspenders. This so fixes and distributes the weight that it is carried with the least fatigue; I think it far preferable to the pear-shaped hand pouches dangling by a cord. Since it cannot be raised to the muzzle of the gun, and since moreover mustard-seed will easily slip through the openings for the slides of the ordinary lever arrangement for measuring the charge of shot, the nozzle of the pouch should have a thimble for the same purpose. The rule of loading being *bulk for bulk* of powder and shot it is often convenient to carry mustard-seed in a powder-flask; the slide works readily through fine shot to cut off a charge, though it will not do so with coarser. Caps are most conveniently carried loose in a right-hand vest pocket, or fob on the outside of the coat; wads in a lower right-hand pocket. c. *For specimens.* You must always carry *paper* in which to wrap up your specimens, as more particularly directed beyond. Nothing is better for this purpose than writing-paper; "rejected" or otherwise useless MSS. may thus be utilized. The ordinary game bag, with leather back and network front, answers very well; but a light basket, fitting the body, such as is used by fishermen, is the best thing to carry specimens in. Avoid putting specimens into *pockets*, unless you have your coat tail largely excavated: crowding them into a close pocket, where they press each other, and receive warmth from the person, will injure them. It is always well to take a little cotton into the field, to plug up shot-holes, mouth, nostrils or vent, immediately, if required. d. *For yourself.* The indications to be fulfilled in your clothing are these: Adaptability to the weather; and since a shooting coat is not conveniently changed, while an overcoat is ordinarily ineligible, the requirement is best met by different underclothes. Easy fit, allowing perfect freedom of muscular action, especially of the arms. Strength of fabric, to resist briars and stand wear; velveteen

and corduroy are excellent materials. Subdued color, to render you as inconspicuous as possible, and to show dirt the least. Multiplicity of pockets—a perfect shooting-coat is an ingenious system of hanging pouches about the person. Broad soled, low heeled boots or shoes, giving a firm tread even when wet. Close-fitting cap with prominent visor, or low soft felt hat, rather broad brimmed. Let india-rubber goods alone; the field is no place for a sweat-bath.

§6. QUALIFICATIONS FOR SUCCESS. With the outfit just indicated you command all the required appliances that you can *buy*, and the rest lies with yourself. Success hangs upon your own exertions; upon your energy, industry and perseverance; your knowledge and skill; your zeal and enthusiasm, in collecting birds, much as in other affairs of life. But that your efforts—maiden attempts they must once have been if they be not such now—may be directed to best advantage, further instructions may not be unacceptable.

§7. TO CARRY A GUN without peril to human life or limb is the *a b c* of its use. "There's death in the pot." Such constant care is required to avoid accidents that no man can give it by continual voluntary efforts; safe carriage of the gun must become an unconscious habit, fixed as the movements of an automaton. The golden rule and whole secret is: *the muzzle must never sweep the horizon*; accidental discharge should send the shot into the ground before your feet, or away up in the air. There are several safe and easy ways of holding a piece: they will be employed by turns to relieve particular muscles when fatigued. 1. Hold it in the hollow of the arm (preferably the left, as you can recover to aim in less time than from the right), across the front of your person, the hand on the grip, the muzzle elevated about 45°. 2. Hang it by the trigger-guard hitched over the forearm brought round to the breast, the stock passing behind the upper arm, the muzzle pointing to the ground a pace or so in front of you. 3. Shoulder it, the hand on the grip or heel plate, the muzzle pointing upward

at least 45°. 4. Shoulder it reversed, the hand grasping the barrels about their middle, the muzzle pointing forward and downward: this is perfectly admissible, but is the most awkward position of all to recover from. *Always carry a loaded gun at half-cock*, unless you are about to shoot. Unless the lock fail, accidental discharge is impossible, except under these circumstances: *a*, a direct blow on the nipple or pin; *b*, catching of both hammer and trigger simultaneously, drawing back of the former and its release whilst the trigger is still held—the chances against which are simply incalculable. Full-cock, ticklish as it seems, is safer than no-cock, when a tap on the hammer or even the heel-plate, or a slight catch and release of the hammer, may cause discharge. Never let the muzzle of a loaded gun point toward your own person for a single instant. Get your gun over fences or into boats or carriages, before you get over or in yourself, or at any rate no later. Remove caps or cartridges on entering a house. Never aim a gun, loaded or not, at any object, unless you mean to press the trigger. Never put a loaded gun away long enough to forget whether it is loaded or not; never leave a loaded gun to be found by others under circumstances reasonably presupposing it to be unloaded. Never put a gun where it can be knocked down by a dog or a child. Never forget that though a gunning accident may be sometimes interpretable (from a certain standpoint) as a “dispensation of Providence,” such are dispensed oftenest to the careless.

§8. TO CLEAN A GUN properly requires some knowledge, more good temper, and most “elbow-grease;” it is dirty, disagreeable, inevitable work, which laziness, business, tiredness, indifference and good taste will by turns tempt you to shirk. After a hunt you are tired, have your clothes to change, a meal to eat, a lot of birds to skin, a journal to write up. If you “sub-let” the contract the chances are it is but half fulfilled; serve yourself, if you want to be well served. If you cannot find time for a regular cleaning, an intolerably foul gun may be made to do another day’s work by swabbing for a few mo-

ments with a wet (not dripping) rag, and then with an oiled one. For the full wash use cold water first; it loosens dirt better than hot water. Set the barrels in a pail of water; wrap the end of the cleaning rod with tow or cloth, and pump away till your arms ache. Change the rag or tow, and the water too, till they both stay clean for all the swabbing you can do. Fill the barrels with boiling water till they are well heated; pour it out, wipe as dry as possible inside and out, and set them by a fire. Finish with a *light* oiling, inside and out; touch up all the metal about the stock, and polish the wood-work. Do not remove the locks oftener than is necessary; every time they are taken out, something of the exquisite fitting that marks a good gun may be lost; as long as they work smoothly take it for granted they are all right. The same direction applies to nipples. To keep a gun well, under long disuse, it should have had a particularly thorough cleaning; the chambers should be packed with greasy tow; greased wads may be rammed at intervals along the barrels; or the barrels may be filled with melted tallow. Neat's-foot is recommended as the best easily-procured oil; porpoise-oil which is, I believe, used by watch-makers, is the very best; the oil made for use on sewing machines is excellent; "olive" oil (made of lard) for table use answers the purpose. The quality of any oil may be improved by putting in it a few tacks, or scraps of zinc,—the oil expends its rusting capacity in oxidizing the metal. Inferior oils get "sticky." One of the best preventives of rust is mercurial ("blue") ointment: it may be freely used. Kerosene will remove rust; but use it sparingly for it "eats" sound metal too.

§9. TO LOAD A GUN effectively requires something more than knowledge of the facts that the powder should go in before the shot, and that each should have a wad a-top. Probably the most nearly universal fault is use of too much shot for the amount of powder; and the next, too much of both. The rule is *bulk for bulk* of powder and shot; if not exactly this, then rather less shot than powder. It is absurd to sup-



pose, as some persons who ought to know better do, that the more shot in a gun the greater the chances of killing. The projectile force of a charge cannot possibly be greater than the *vis inertiae* of the gun as held by the shooter. The explosion is manifested in all directions, and blows the shot one way simply and only because it has no other escape. If the resistance in front of the powder were greater than elsewhere the shot would not budge, but the gun would fly backward, or burst. This always reminds me of Lord Dundreary's famous conundrum—Why does a dog wag his tail? Because he is bigger than his tail; otherwise, the tail would wag *him*. A gun shoots shot because the gun is the heavier; otherwise, the shot would shoot the gun. Every unnecessary pellet is a pellet against you, not against the game. The experienced sportsman uses about one-third less shot than the tyro, with proportionally better result, other things being equal. As to powder, moreover, a gun can only burn just so much, and every grain blown out unburnt is wasted if nothing more. No express directions for absolute weight or measures of either powder or shot can be given; in fact, different guns take as their most effective charge such a variable amount of ammunition, that one of the first things you have to learn about your own arm is, its normal charge-gauge. Find out, by assiduous target practice, what absolute amounts (and to a slight degree, what relative proportion) of powder and shot are required to shoot the furthest and distribute the pellets most evenly. This practice, furthermore, will acquaint you with the gun's capacities in every respect. You should learn exactly what it will and what it will not do, so as to feel perfect confidence in your arm within a certain range, and to waste no shots in attempting miracles. Immoderate recoil is a pretty sure sign that the gun was overloaded, or otherwise wrongly charged; and all force of recoil is subtracted from the impulse of the shot. It is useless to ram powder very hard; two or three smart taps of the rod will suffice, and more will not increase the explosive force. On the shot the wad should simply be pressed close enough to fix the pellets immovably. All these directions apply to the charging of metal or paper

cartridges as well as to loading by the muzzle. When about to recharge one barrel see that the hammer of the other stands at half-cock. Do not drop the ramrod into the other barrel, for a stray shot might impact between the swell of the head and the gun and make it difficult to withdraw the rod. During the whole operation keep the muzzle as far from your person as you conveniently can. Never force home a wad with the flat of your hand over the end of the rod, but hold the rod between your fingers and thumb; in case of premature explosion, it will make just the difference of lacerated finger tips, or a blown-up hand. Never look into a loaded gun barrel; you might as wisely put your head into a lion's mouth to see what the animal had for dinner. After a miss-fire hold the gun up a few moments and be slow to reload; the fire sometimes "hangs" for several seconds. Finally, let me strongly impress upon you the expediency of *light loading* in your routine collecting. Three-fourths of your shots need not bring into action the gun's full powers of execution. You will shoot more birds under than over 30 yards; not a few, you must secure, if at all, at 10 or 15 yards; and your object is always to kill them with the least possible damage to the plumage. I have, on particular occasions, loaded even down to  $\frac{1}{4}$  oz. of shot and  $1\frac{1}{2}$  dr. of powder. There is astonishing force compressed in a few grains of powder; an astonishing number of pellets in the smallest load of mustard-seed. If you *can* load so nicely as to just drive the shot into a bird and not through it and out again, do so, and save half the holes in the skin.

§10. To shoot successfully is an art which may be acquired by practice, and can be learned only in the school of experience. No general directions will make you a good shot, any more than a proficient in music or painting. To tell you that in order to hit a bird you must point the gun at it and press the trigger, is like saying that to play on the fiddle you must shove the bow across the strings with one hand while you finger them with the other; in either case the result is the same, a noise — *vox et præterea nihil* — but neither music nor game.

Nor is it possible for every one to become an artist in gunnery ; a "crack shot," like a poet, is born, not made. For myself I make no pretensions to genius in that direction ; for although I generally make fair bags, and have destroyed many thousand birds in my time, this is rather owing to some familiarity I have gained with the habits of birds, and a certain knack, acquired by long practice, of picking them out of trees and bushes, than to skilful shooting from the sportsman's standpoint ; in fact, if I cut down two or three birds on the wing without a miss I am working quite up to my average in that line. But any one, not a purblind "butter fingers," can become a reasonably fair shot by practice, and do good collecting. It is not so hard, after all, to sight a gun correctly on an immovable object, and collecting differs from sporting proper in this, that comparatively few birds are shot on the wing. But I do not mean to imply that it requires less skill to collect successfully than to secure game ; on the contrary, it is finer shooting, I think, to drop a warbler skipping about a tree-top than to stop a quail at full speed ; while hitting a sparrow that springs from the grass at one's feet to flicker in sight a few seconds and disappear is the most difficult of all shooting. Besides, a crack shot, as understood, aims unconsciously, with mechanical accuracy and certitude of hitting ; he simply wills, and the trained muscles obey without his superintendence, just as the fingers form letters with the pen in writing ; whereas the collector must usually supervise his muscles all through the act and see that they mind. In spite of the proportion of snap shots of all sorts you will have to take, your collecting shots, as a rule, are made with deliberate aim. There is much the same difference, on the whole, between the sportsman's work and the collector's, that there is between shot-gun and rifle practice, collecting being comparable to the latter. It is generally understood that the acme of skill with the two weapons is an incompatibility ; and certainly, the best shot is not always the best collector, even supposing the two to be on a par in their knowledge of birds' haunts and habits. Still, a hopelessly poor shot can only attain fair results by

extraordinary diligence and perseverance. Certain principles of shooting may perhaps be reduced to words. Aim deliberately directly at an immovable object at fair range. Hold over a motionless object when far off, as the trajectory of the shot curves downward. Hold a little to one side of a stationary object when very near, preferring rather to take the chances of missing it with the peripheral pellets, than of hopelessly mutilating it with the main body of the charge. Fire at the first fair aim, without trying to improve what is good enough already. Never "pull" the trigger, but *press* it. Bear the shock of discharge without finching. In shooting on the wing, fire the instant the butt of the gun taps your shoulder; you will miss at first, but by and by the birds will begin to drop, and you will have laid the foundation of good shooting, the knack of "covering" a bird unconsciously. The habit of "poking" after a bird on the wing is an almost incurable vice, and may keep you a poor shot all your life. (The collector's frequent necessity of poking after little birds in the bush is just what so often hinders him from acquiring brilliant execution.) Aim *ahead* of a flying bird—the calculation to be made varies, according to the distance of the object, its velocity, its course and the wind, from a few inches to several feet; practice will finally render it intuitive.

## CHAPTER II.

### DOGS.

§11. A GOOD DOG is one of the most faithful, respectful, affectionate and sensible of brutes; deference to such rare qualities demands a chapter, however brief. A trained dog is the indispensable servant of the sportsman in his pursuit of most kinds of game; but I trust I am guilty of no discourtesy to the noble animal, when I say that he is a luxury rather than a necessity to the collector—a pleasant companion, who knows almost everything except how to talk, who converses with his eyes and ears and tail, shares comforts and discomforts with equal alacrity, and occasionally makes himself useful. So far as a collector's work tallies with that of a sportsman, the dog is equally useful to both; but finding and telling of *game* aside, your dog's services are restricted to companionship and retrieving. He may, indeed, flush many sorts of birds for you; but he does it, if at all, at random, while capering about; for the brute intellect is limited after all, and cannot comprehend a naturalist. The best trained setter or pointer that ever marked a quail could not be made to understand what you are about, and it would ruin him for sporting purposes if he did. Take a well-bred, high-toned dog out with you, and the chances are he will soon trot home in disgust at your performances with jack-sparrows and tomtits. It implies such a lowering and perversion of a good dog's instincts to make him really a useful servant of yours, that I am half inclined to say nothing about retrieving, and tell you to make a companion of your dog, or let him alone. I was followed for several years by "the best dog I ever saw" (every one's gun, dog, and child is the best ever seen), and a first-rate retriever; yet I always preferred, when practicable, to pick up my own birds, rather than let a delicate plumage into a dog's mouth, and scolded away the poor brute so often, that she very properly returned the compliment, in the end, by

retrieving just when she felt like it. However, we remained the best of friends. Any good setter, pointer or spaniel, and some kinds of curs, may be trained to retrieve. The great point is to teach them not to "mouth" a bird; it may be accomplished by sticking pins in the ball with which their early lessons are taught. Such dogs are particularly useful in bringing birds out of the water, and in searching for them when lost. One point in training should never be neglected: teach a dog what "to heel" means, and make him obey this command. A riotous brute is simply unendurable under any circumstances.

## CHAPTER III.

### VARIOUS SUGGESTIONS AND DIRECTIONS FOR FIELD-WORK.

§12. TO BE A GOOD COLLECTOR, and nothing more, is a small affair; great skill may be acquired in the art, without a single quality commanding respect. One of the most vulgar, brutal and ignorant men I ever knew was a sharp collector and an excellent taxidermist. Collecting stands much in the same relation to ornithology that the useful and indispensable office of an apothecary bears to the duties of a physician. A field-naturalist is always more or less of a collector; the latter is sometimes found to know almost nothing of natural history worth knowing. The true ornithologist goes out to study birds alive and destroys some of them simply because that is the only way of learning their structure and technical characters. There is much more about a bird than can be discovered in its dead body—how much more, then, than can be found out from its stuffed skin! In my humble opinion the man who only gathers birds, as a miser, money, to swell his cabinet, and that other man who gloats, as miser-like, over the same hoard, both work on a plane far beneath where the enlightened naturalist stands. One looks at Nature, and never knows that she is beautiful; the other knows she is beautiful, as even a corpse may be; the naturalist catches her sentient expression, and knows how beautiful she is! I would have you to know and love her; for fairer mistress never swayed the heart of man. Aim high!—press on, and leave the half-way-house of mere collectorship far behind in your pursuit of a delightful study, nor fancy the closet its goal.

§13. BIRDS may be sought anywhere, at any time; they should be sought everywhere, at all times. Some come about your doorstep to tell their stories unasked. Others spring up before you as you stroll in the field, like the flowers that enticed

the feet of Proserpine. Birds flit by as you measure the tired roadside, lending a tithe of their life to quicken your dusty steps. They disport overhead at hide-and-peek with the foliage as you loiter in the shade of the forest, and their music now answers the sigh of the tree-tops, now ripples an echo to the voice of the brook. But you will not always so pluck a thornless rose. Birds hedge themselves about with a bristling girdle of brier and bramble you cannot break; they build their tiny castles in the air surrounded by impassable moats, and the drawbridges are never down. They crown the mountain-top you may lose your breath to climb; they sprinkle the desert where your parched lips may find no cooling draught; they fleck the snow-wreath when the nipping blast may make you turn your back; they breathe unharmed the pestilent vapors of the swamp that mean disease, if not death, for you; they outride the storm at sea that sends strong men to their last account. Where now will you look for birds?

§14. AND YET, as skilled labor is always most productive, so expert search yields more than random or blundering pursuit. *Imprimis*; The more varied the face of a country, the more varied its birds. A place all plain, all marsh, all woodland, yields its particular set of birds, perhaps in profusion; but the kinds will be limited in number. It is of first importance to remember this, when you are so fortunate as to have choice of a collecting-ground; and it will guide your steps aright in a day's walk anywhere, for it will make you leave covert for open, wet for dry, high for low and back again. Well-watered country is more fruitful of bird-life than desert or even prairie; warm regions are more productive than cold ones. As a rule, variety and abundance of birds are in direct ratio to diversity and luxuriance of vegetation. Your most valuable as well as largest bags may be made in the regions most favored botanically, up to the point where exuberance of plant-growth mechanically opposes your operations.

§15. SEARCH for particular birds can only be well directed,



of course, by a knowledge of their special haunts and habits, and is one of the mysteries of wood-craft only solved by long experience and close observation. Here is where the true naturalist bears himself with conscious pride and strength, winning laurels that become him, and do honor to his calling. Where to find *game* ("game" is anything that vulgar people do not ridicule you for shooting) of all the kinds we have in this country has been so often and so minutely detailed in sporting-works that it need not be here enlarged upon, especially since, being the best known, it is the least valuable of ornithological material. Most *large* or otherwise conspicuous birds have very special haunts that may be soon learned; and as a rule such rank next after game in ornithological disesteem. Birds of prey are an exception to these statements, they range everywhere, and most of them are worth securing. Hawks will unwittingly fly in your way oftener than they will allow you to approach them when perched: be ready for them. Owls will be startled out of their retreats in thick bushes, dense foliage, and hollow trees, in the daytime; if hunting them at night, good aim in the dark may be taken by rubbing a wet lucifer match on the sight of the gun, causing a momentary glimmer. Large and small waders are to be found by any water's-edge, in open marshes, and often on dry plains; the herons more particularly in heavy bogs and dense swamps. Under cover, waders are oftenest approached by stealth; in the open, by strategy; but most of the smaller kinds require the exercise of no special precautions. Swimming birds, aside from water-fowl (as the "game" kinds are called), are generally shot from a boat, as they fly past; but at their breeding places many kinds that congregate in vast numbers are more readily reached. There is a knack of shooting loons and grebes on the water; if they are to be reached at all by the shot it will be by aiming not directly at them but at the water just in front of them. They do not go under just where they float, but kick up behind like a jumping-jack and plunge *forward*. Rails and several kinds of sparrows are confined to reedy marshes. But why prolong such desultory remarks?

## 24 SUGGESTIONS AND DIRECTIONS FOR FIELD-WORK.

Little can be said to the point without at least a miniature treatise on ornithology; and I have not yet even alluded to the diversified host of small insectivorous and granivorous birds that fill our woods and fields. The very existence of most of these is unknown to all but the initiated; yet they include the treasures of the ornithologist. Some are plain and humble, others are among the most beautiful objects in nature; but most agree in being *small*, and therefore liable to be overlooked. The sum of my advice about them must be brief. Get over as much ground, both wooded and open, as you can thoroughly examine in a day's tramp, and go out as many days as you can. It is not always necessary, however, to keep on the tramp, especially during the migration of the restless insectivorous species. One may often shoot for hours without moving more than a few yards, by selecting a favorable locality and allowing the birds to come to him as they pass in varied troops through the low woodlands or swampy thickets. Keep your eyes and ears wide open. Look out for every rustling leaf and swaying twig and bending blade of grass. Hearken to every note, however faint; when there is no sound, listen for a chirp. Habitually move as noiselessly as possible. Keep your gun *always* ready. Improve every opportunity of studying a bird you do not wish to destroy; you may often make observations more valuable than the specimen. Let this be the rule with all birds you recognize. But I fear I must tell you to shoot an unknown bird on sight; it may give you the slip in a moment, and a prize may be lost. One of the most fascinating things about field-work is its delightful uncertainty: you never know what's in store for you as you start out; you never can tell what will happen next; surprises are always in order, and excitement is continually whetted on the chances of the varied chase.

For myself, the time is past, happily or not, when every bird was an agreeable surprise, for dewdrops do not last all day; but I have never yet walked in the woods without learning something pleasant that I did not know before. I should consider a bird new to science ample reward for a month's

steady work; *one* bird new to a locality would repay a week's search; a day is happily spent that shows me any bird that I never saw alive before. How then can you, with so much before you, keep out of the woods another minute?

§16. ALL TIMES are good times to go a-shooting; but some are better than others. a. *Time of year.* In all temperate latitudes, the spring and fall—periods of migration with most birds—are the most profitable seasons for collecting. Not only are birds then most numerous, both as species and as individuals, and most active, so as to be the more readily found, but they include a far larger proportion of rare and valuable kinds. In every locality in this country the periodical visitants outnumber the permanent residents; in most regions the number of regular migrants, that simply pass through in the spring and fall, equals or exceeds that of either of the sets of species that come from the south in spring to breed during the summer, or from the north to spend the winter. Far north, of course, on or near the limit of the vernal migration, where there are few if any migrants *passing through*, and where the winter birds are extremely few, nearly all the bird fauna is composed of “summer visitants;” far south, in this country, the reverse is somewhat the case, though with many qualifications. Between these extremes, what is conventionally known as “a season” means the period of the vernal or autumnal migration. For example, the body of birds present in the District of Columbia (where I collected for several years) in the two months from April 20th to May 20th, and from September 10th to October 10th, is undoubtedly greater, as far as individuals are concerned, than the total number found there at all other seasons of the year together. As for species, the number of migrants about equals that of summer visitants; the permanent residents equal the winter residents, both these being fewer than either of the first mentioned sets; while the irregular visitors, or stragglers, that complete the bird fauna, are about, or rather less than, one-half as many as the species of either of the other categories. About Washington, therefore, I would

readily undertake to secure a greater *variety* of birds in the nine weeks above specified than in all the rest of the year; for in that time would be found, not only all the permanent residents, but nearly all the migrants, and almost all the summer visitants; while the number of individual birds that might be taken exceeds, by quite as much, the number of those procurable in the same length of time at any other season. *Mutatis mutandis*, it is the same everywhere in this country. Look out then, for "the season;" work all through it at a rate you could not possibly sustain the year around; and make hay while the sun shines.

b. *Time of day.* Early in the morning and late in the afternoon are the best times for birds. There is a mysterious something in these diurnal crises that sets bird-life astir, over and above what is explainable by the simple fact that they are the transition periods from repose to activity, or the reverse. Subtile meteorological changes occur; various delicate instruments used in physicists' researches are sometimes inexplicably disturbed; diseases have often their turning point for better or worse; people are apt to be born or die; and the susceptible organisms of birds manifest various excitements. Whatever the operative influence, the fact is, birds are particularly lively at such hours. In the dark, they rest—most of them do: at noonday, again, they are comparatively still; between these times they are passing to or from their feeding grounds or roosting places; they are foraging for food, they are singing; at any rate, they are in motion. Many migratory birds (among them warblers, etc.) perform their journeys by night; just at daybreak they may be seen to descend from the upper regions, rest awhile, and then move about briskly, singing and searching for food. Their meal taken, they recuperate by resting till towards evening: feed again and are off for the night. If you have had some experience, don't you remember what a fine spurt you made early that morning?—how many unexpected shots offered as you trudged home belated that evening? Now I am no fowl, and have no desire to adopt the habits of the hen-yard; I have my opinion of those who like the world before it is aired; I think it served the worm right for getting up, when

caught by the early bird ; nevertheless I go shooting betimes in the morning, and would walk all night to find a rare bird at daylight. c. *Weather*. It rarely occurs in this country that either heat or cold is unendurably severe ; but extremes of temperature are unfavorable, for two reasons : they both occasion great personal discomfort ; and in one extreme only a few hardy birds will be found, while in the other, most birds are languid, disposed to seek shelter, and therefore less likely to be found. A still, cloudy day of moderate temperature offers as a rule the best chance ; among other reasons, there is no sun to blind the eyes, as always occurs on a bright day in one direction, particularly when the sun is low. While a bright day has its good influence in setting many birds astir, some others are most easily approached in heavy or falling weather. Some kinds are more likely to be secured during a light snowfall, or after a storm. Singular as it may seem, a thoroughly wet day offers some peculiar inducements to the collector. I cannot well specify them, but I heartily endorse a remark John Cassin once made to me :—“I like,” said he, “to go shooting in the rain sometimes ; there are some curious things to be learned about birds when the trees are dripping, things too that have not yet found their way into the books.”

§17. HOW MANY BIRDS OF THE SAME KIND DO YOU WANT? — *All you can get* — with some reasonable limitations ; say fifty or a hundred of any but the most abundant and widely diffused species. You may often be provoked with your friend for speaking of some bird he shot, but did not bring you, because, he says, “Why, you’ve got one like that!” This is just as reasonable as to suppose that because you have got one dollar you would not like to have another dollar. Birdskins are capital ; capital unemployed may be useless but can never be worthless. Birdskins are a medium of exchange among ornithologists the world over ; they represent value — money value and scientific value. If you have more of one kind than you can use exchange with some one for species you lack ; both parties to the transaction are equally benefited. Let me bring

this matter under several heads. *a.* Your own "series" of skins of any species is incomplete until it contains at least one example of each sex, of every normal state of plumage, and every normal transition stage of plumage, and further illustrates at least the principal abnormal variations in size, form and color to which the species may be subject; I will even add that every different faunal area the bird is known to inhabit should be represented by a specimen, particularly if there be anything exceptional in the geographical distribution of the species. Any additional specimens to all such are your *only* "duplicates," properly speaking. *b.* Birds vary so much in their size, form and coloring, that a "specific character" can only be precisely determined from examination of a large number of specimens, shot at different times, in different places; still less can the "limits of variation" in these respects be settled without ample materials. *c.* The *rarity* of any bird is necessarily an arbitrary and fluctuating consideration, because in the nature of the case there can be no natural unit of comparison, nor standard of appreciation. It may be said, in general terms, no bird is actually "rare." With a few possible exceptions, as in the cases of birds occupying extraordinarily limited areas, like some of the birds of paradise, or about to become extinct, like the great auk, enough birds of all kinds exist to overstock every public and private collection in the world, without sensible diminution of their numbers. "Rarity" or the reverse is only predicable upon the accidental (so to speak) circumstances that throw, or tend to throw, specimens into naturalists' hands. *Accessibility* is the variable element in every case. The fulmar petrel is said (on what authority I know not) to exceed any other bird in its aggregate of individuals; how do the skins of that bird you have handled compare in number with specimens you have seen of the "rare" warbler of your own vicinity? All birds are common somewhere at some season; the point is, have collectors been there at the time? Moreover, even the arbitrary appreciation of "rarity" is fluctuating, and may change at any time; long sought and highly prized birds are liable to appear suddenly in great num-

bers in places that knew them not before; a single heavy "invoice" of a bird from some distant or little-explored region may at once stock the market, and depreciate the current value of the species to almost nothing. *d.* Some practical deductions are to be made from these premises. Your object is to make yourself acquainted with all the birds of your vicinity, and to preserve a complete suite of specimens of every species. Begin by shooting every bird you can, coupling this sad destruction, however, with the closest observations upon habits. You will very soon fill your series of a few kinds, that you find almost everywhere, almost daily. Then if you are in a region the ornithology of which is well known to the profession, at once stop killing these common birds — they are in every collection. You should not, as a rule, destroy any more robins, bluebirds, song-sparrows, and the like, than you want for yourself. Keep an eye on them, studying them always, but turn your actual pursuit into other channels, until in this way, gradually eliminating the undesirables, you exhaust the bird fauna as far as possible (you will not *quite* exhaust it — at least for many years). But if you are in a new or little known locality, I had almost said the very reverse course is the best. The chances are that the most abundant and characteristic birds are "rare" in collections. Many a bird's range is quite restricted: you may happen to be just at its metropolis; seize the opportunity, and get good store — yes, up to fifty, or a hundred; all you can spare will be thankfully received by those who have none. Quite as likely, birds that are scarce just where you happen to be, are so only because you are on the edge of their habitat, and are plentiful in more accessible regions. But, rare or not, it is always a point to determine the exact geographical distribution of a species: and this is fixed best by having specimens to tell each its own tale, from as many different and widely separated localities as possible. This alone warrants procuring one or more specimens in every locality; the commonest bird acquires a certain value if it be captured away from its ordinary range. An Eastern Bluebird shot in California might be considered more valuable

than the "rarest" bird of that state, and would certainly be worth a hundred Massachusetts skins; the Varied Thrush (*Turdus naevius*) that was killed at Ipswich, Mass., is worth a like number from Oregon. But let all your justifiable destruction of birds be tempered with mercy; your humanity will be continually shocked with the havoc you work, and should never permit you to take life wantonly. Never shoot a bird you do not fully intend to preserve, or to utilize in some proper way. Bird-life is too beautiful a thing to destroy to no purpose: too sacred a thing, like all life, to be sacrificed, unless the tribute is hallowed by worthiness of motive. "Not a sparrow falleth to the ground without His notice."

§18. WHAT IS "A GOOD DAY'S WORK?" Fifty birds shot, their skins preserved, and observations recorded, is a *very* good day's work; it is sharp practice even when birds are plentiful. I never knew a person to *average* anywhere near it; even during the "season" such work cannot possibly be sustained. You may, of course, by a murderous discharge into a flock, as of blackbirds or reedbirds, get a hundred or more in a moment; but I refer to collecting a fair variety of birds. You will do very well if you *average* a dozen a day during the seasons. I doubt whether any collector ever averaged as many the year around; it would be over four thousand specimens annually. The greatest number I ever procured *and prepared* in one day was forty, and I have not often gone over twenty. Even when collecting regularly and assiduously I am satisfied to average a dozen a day during the migrations, and one-third or one-fourth as many the rest of the year. Probably this implies the shooting of about one in five not skinned for various reasons, as mutilation, decay, or want of time.

§19. APPROACHING BIRDS. There is little if any trouble in getting near enough to shoot most birds. With notable exceptions, they are harder to see when near enough, or to hit when seen; particularly small birds that are almost incessantly in motion. As a rule—and a curious one it is—difficulty of



approach is in direct ratio to the *size* of the bird ; it is perhaps because large, conspicuous birds are objects of more general pursuit than the little ones you ordinarily search for. The qualities that birds possess for self-preservation may be called *wariness* in large birds, *shyness* in small ones. The former make off knowingly from a suspicious object ; the latter fly from anything that is strange to them, be it dangerous or not. This is strikingly illustrated in the behavior of small birds in the wilderness, as contrasted with their actions about towns ; singular as it may seem they are more timid under the former circumstances than when grown accustomed to the presence of man. It is just the reverse with a hawk or raven, for instance ; in populous districts they spend much of their time in trying to save their skins, while in a new country they have not learned, like Indians, that a white man is "mighty uncertain." In stealing on a shy bird, you will of course take advantage of any cover that may offer, as inequalities of the ground, thick bushes, the trunks of trees ; and it is often worth while to make a considerable *détour* to secure unobserved approach. I think that birds are more likely, as a rule, to be frightened away by the movements of the collector, than by his simple presence, however near, and that they are more afraid of noise than of mere motion. Crackling of twigs and rustling of leaves are sharp sounds, though not loud ones ; you may have sometimes been surprised to find how distinctly you could hear the movements of a horse or cow in underbrush at some distance. Birds have sharp ears for such sounds. Form a habit of stealthy movement ; *it tells*, in the long run, in comparison with lumbering tread. There are no special precautions to be taken in shooting through high open forest ; you have only to saunter along with your eyes in the tree-tops. It is ordinarily the easiest and on the whole the most remunerative path of the collector. In traversing fields and meadows move briskly, your principal object being to flush birds out of the grass ; and as most of your shots will be snap ones, keep in readiness for instant action. Excellent and varied shooting is to be had along hedge rows, and in the rank herbage that fringes fences. It is best

to keep at a little distance, yet near enough to arouse all the birds as you pass: you may catch them on wing, or pick them off just as they settle after a short flight. In this shooting, two persons, one on each side, can together do more than twice as much work as one. Thickets and tangled undergrowth are favorite resorts of many birds; but when very close, or, as often happens, over miry ground, they are hard places to shoot in. As you come thrashing through the brush, the little inhabitants are scared into deeper recesses; but if you keep still a few minutes in some favorable spot, they are reassured, and will often come back to take a peep at you. A good deal of standing still will repay you at such times; needless to add, you cannot be too lightly loaded for such shooting, when birds are mostly out of sight if a dozen yards off. When yourself concealed in a thicket, and no birds appear, you can often call numbers about you by a simple artifice. Apply the back of your hand to your slightly parted lips, and suck in air; it makes a nondescript "screeching" noise, variable in intonation at your whim, and some of the sounds resemble the cries of a wounded bird, or a young one in distress. It wakes up the whole neighborhood, and sometimes puts certain birds almost beside themselves, particularly in the breeding season. Torturing a wounded bird to make it scream in agony accomplishes the same result, but of course is only permissible under great exigency. In penetrating swamps and marshes, the best advice I can give you is to tell you to get along the best way you can. Shooting on perfectly open ground offers much the same case; you must be left to your own devices. I will say, however, you can ride on horseback, or even in a buggy, nearer birds than they will allow you to walk up to them. Sportsmen take advantage of this to get within a shot of the upland plover, usually a very wary bird in populous districts; I have driven right into a flock of wild geese; in California they often train a bullock to graze gradually up to geese, the gunner being hidden by its body. There is one trick worth knowing; it is not to let a bird that has seen you know by your action that you have seen *it*, but to keep on unconcernedly, gradually sidling nearer. I have

secured many hawks in this way, when the bird would have flown off at the first step of direct approach. Numberless other little arts will come to you as your wood-craft matures.

§20. RECOVERING BIRDS. It is not always that you secure the birds you kill; you may not be able to find them, or you may see them lying, perhaps but a few feet off, in a spot practically inaccessible. Under such circumstances a retriever does excellent service, as already hinted; he is equally useful when a bird properly "marked down" is not found there, having fluttered or run away and hidden elsewhere. The most difficult of all places to find birds is among reeds, the eternal sameness of which makes it almost impossible to rediscover a spot whence the eye has once wandered, while the peculiar growth allows birds to slip far down out of sight. In rank grass or weeds, when you have walked up with your eye fixed on the spot where the bird seemed to fall, yet failed to discover it, drop your cap or handkerchief for a mark, and hunt around it as a centre, in enlarging circles. In thickets, make a "bee line" for the spot, if possible keeping your eye on the spray from which the bird fell, and not forgetting where you stood on firing; you may require to come back to the spot and take a new departure. You will not seldom see a bird just shot at fly off as if unharmed, when really it will drop dead in a few moments. In all cases therefore when the bird does not drop at the shot, follow it with your eyes as far as you can; if you see it finally drop, or even flutter languidly downward, mark it on the principles just mentioned, and go in search. Make every endeavor to secure wounded birds, on the score of humanity; they should not be left to pine away and die in lingering misery if it can possibly be avoided.

§21. KILLING WOUNDED BIRDS. You will often recover winged birds, as full of life as before the bone was broken; and others too grievously hurt to fly, yet far from death. Your object is to kill them as quickly and painlessly as possible, without injuring the plumage. This is to be accomplished,

with all small birds, by suffocation. The respiration and circulation of birds is very active, and most of them die in a few moments if the lungs are so compressed that they cannot breathe. Squeeze the bird tightly across the chest, under the wings, thumb on one side, middle finger on the other, forefinger pressed in the hollow at the root of the neck, between the forks of the merrythought. Press firmly, hard enough to fix the chest immovably and compress the lungs, but not to break in the ribs. The bird will make vigorous but ineffectual efforts to breathe, when the muscles will contract spasmodically; but in a moment more, the system relaxes with a painful shiver, light fades from the eyes, and the lids close. I assure you, it will make you wince the first few times; you had better habitually hold the poor creature behind you. You can tell by its limp feel and motionlessness when it is dead, without watching the sad struggle. Large birds obviously cannot be dealt with in this way; I would as soon attempt to throttle a dog as a loon, for instance, upon which all the pressure you can give makes no sensible impression. A winged hawk, again, will throw itself on its back as you come up, and show such good fight with beak and talons, that you may be quite severely scratched in the encounter; meanwhile, the struggling bird may be bespattering its plumage with blood. In such a case—in any case of a large bird making decided resistance—I think it best to step back a few paces and settle the matter with a light charge of mustard-seed. Any large bird once secured may be speedily dispatched by stabbing to the heart with some slender instrument thrust in under the wing—care must be taken too about the bleeding; or, it may be instantly killed by piercing the brain with a knife introduced into the mouth and drawn upward and obliquely backward from the palate. The latter method is preferable, as it leaves no outward sign, and causes no bleeding to speak of. With your thumb, you may indent the back part of a bird's skull so as to compress the cerebellum; if you can get deep enough in, without materially disordering the plumage, or breaking the skin, the method is unobjectionable.

§22. HANDLING BLEEDING BIRDS. Bleeding depends altogether upon the part or organ wounded; but other things being equal, violence of the hæmorrhage is usually in direct proportion to the size of the shot-hole; when mustard-seed is used it is ordinarily very trifling, if it occur at all. Blood flows oftener from the orifice of *exit* of a shot, than from the wound of entrance, for the latter is usually plugged with a little wad of feathers driven in. Bleeding from the mouth or nostrils is the rule when the lungs are wounded. When it occurs, hold up the bird by the feet, and let it drip; a general squeeze of the body in that position will facilitate the drainage. In general, hold a bird so that a bleeding place is most dependent; then, pressure about the part will help the flow. A "gob" of blood, which is simply a forming clot, on the plumage may often be dextrously flipped almost clean away with a snap of the finger. It is first-rate practice to take cotton and forceps into the field to plug up shot-holes, and stop the mouth, nostrils and vent on the spot. I follow the custom of the books in recommending this, but I will confess I have rarely done it myself, and I suspect that only a few of our most leisurely and elegant collectors do so habitually. Shot-holes may be found by gently raising the feathers, or blowing them aside; you can of course get only a tiny plug into the wound itself, but it should be one end of a sizable pledget, the rest lying fluffy among the feathers. In stopping the mouth or vent, ram the fluff, of cotton, entirely inside. You cannot conveniently stop up the nostrils of small birds separately; but take a light *cylinder* of cotton, lay it transversely across the base of the upper mandible, closely covering the nostrils, and confine it there by tucking each end tightly into the corner of the mouth. In default of such nice fixing as this, a pinch of dry loam pressed on a bleeding spot will plaster itself there and stop further mischief. Never try to *wipe off* fresh blood that has already wetted the plumage; you will only make matters worse. Let it dry on, and then—but the treatment of bloodstains, and other soilings of plumage, is given beyond.

§23. CARRYING BIRDS HOME SAFE. Suppose you have secured a fine specimen, very likely without a soiled or ruffled feather; your next care will be to keep it so till you are ready to skin it. But if you pocket or bag it directly, it will be a sorry looking object before you get home. Each specimen must be separately cared for, by wrapping in stout paper; writing paper is as good as any, if not the best. It will repay you to prepare a stock of paper before starting out; your most convenient sizes are those of a half sheet of note, of letter, and of cap respectively. Either take these, or fold and cut newspaper to correspond; besides, it is always well to have a *whole* newspaper or two for large birds. Plenty of paper will go in the breast pockets of the shooting coat. Make a "cornucopia"—the simplest thing in the world, but, like tying a particular knot, hard to explain. Setting the wings closely, adjusting disturbed feathers, and seeing that the bill points straight forward, thrust the bird head first into one of these paper cones, till it will go no further, being bound by the bulge of the breast. Let the cone be large enough for the open end to fold over or pinch together entirely beyond the tail. Be particular not to crumple or bend the tail feathers. Lay the paper cases in the game bag or great pocket so that they very nearly run parallel and lie horizontal; they will carry better than if thrown in at random. Avoid overcrowding the packages, as far as is reasonably practicable; moderate pressure will do no harm, as a rule, but if great it may make birds bleed afresh, or cause the fluids of a wounded intestine to ooze out and soak the plumage of the belly—a very bad accident indeed. For similar obvious reasons, do not put a large heavy bird on top of a lot of little ones; I would sooner sling a hawk or heron over my shoulder, or carry it by hand. If it goes in the bag, see that it gets to the bottom. Avoid putting birds in pockets that are close about your person; they are almost always unduly pressed, and may gain just enough additional warmth from your body to make them begin to decompose before you can get at skinning them. Handle birds no more than is necessary, especially white plumaged ones; ten to one

your hands are powder-begrimed ; and besides, even the warmth and moisture of your palms may tend to injure a delicate feathering. Ordinarily pick up a bird by the feet or bill ; as you need both hands to make the cornucopia, let the specimen dangle by the toes from your teeth while you are so employed. In catching at a wounded bird, aim to cover it entirely with your hand : but whatever you do, never seize it by the tail, which then will often be left in your hands for your pains. Never grasp wing tips or tail feathers ; these large flat quills would get a peculiar crimping all along the webs, very difficult to efface. Finally, I would add there is a certain knack or art in manipulating, either of a dead bird or a birdskin, by which you may handle it with seeming carelessness and perfect impunity ; whilst the most gingerly fingering of an inexperienced person will leave its rude trace. You will naturally acquire the correct touch ; but it can be neither taught nor described.

§24. A SPECIAL CASE. While the ordinary run of land birds will be brought home in good order by the foregoing method, some require special precautions. I refer to seabirds, such as gulls, terns, petrels, etc., shot from a boat. In the first place, the plumage of most of them is, in part at least, white and of exquisite purity. Then, fish-eating birds usually vomit and purge when shot. They are necessarily fished all dripping from the water. They are too large for pocketing. If you put them on the thwarts or elsewhere about the boat, they usually fall off, or are knocked off, into the bilge water ; if you stow them in the cubby-hole, they will assuredly soil by mutual pressure, or by rolling about. It will repay you to pick them from the water by the bill, and shake off all the water you can ; hold them up, or let some one do it, till they are tolerably dry ; plug the mouth, nostrils and vent, if not also shot-holes ; wrap each one separately in a *cloth* (*not* paper) or a mass of tow, and pack steadily in a covered box or basket taken on board for this purpose.

§25. HYGIENE OF COLLECTORSHIP. It is unnecessary to

speak of the healthfulness of a pursuit that, like the collector's occupation, demands regular bodily exercise, and at the same time stimulates the mind by supplying an object, thus calling the whole system into exhilarating action. Yet collecting has its perils, not to be overlooked if we would adequately guard against them—as fortunately we may, in most cases, by simple precautions. The dangers of taxidermy itself are elsewhere noticed; besides these, the collector is exposed to vicissitudes of the weather, may endure great fatigue, may breathe miasm, and may be mechanically injured. ACCIDENTS from the gun have been already treated; a few special rules will render others little liable to occur. The secret of safe *climbing* is never to relax one hold until another is secured; it is in spirit equally applicable to scrambling over rocks, a particularly difficult thing to do safely with a loaded gun. Test rotten, slippery or otherwise suspicious holds before trusting them. In lifting the body up anywhere keep the mouth shut, breathe through the nostrils, and go slowly. In *swimming*, waste no strength unnecessarily in trying to stem a current; yield partly, and land obliquely lower down; if exhausted, float—the slightest motion of the hands will ordinarily keep the face above water; and in any event keep your wits collected. In fording deeply a heavy stone will strengthen your position. Never sail a boat experimentally; if you are no sailor take one with you or stay on land. In crossing a high, narrow footpath never look lower than your feet; the muscles will work true, if not confused with faltering instructions from a giddy brain. On soft ground, see what, if anything, has preceded you; large hoof marks generally mean that the way is safe; if none are found, inquire for yourself before going on. Quicksand is the most treacherous, because far more dangerous than it looks; but I have seen a mule's ears finally disappear in genuine mud. Cattle paths, however erratic, commonly prove the surest way out of a difficult place, whether of uncertain footing or dense undergrowth. MIASM: Unguarded exposure in malarious regions usually entails sickness, often preventable, however, by due precautions. It is worth knowing



in the first place that miasmatic poison is most powerful between sunset and sunrise—more exactly, from the damp of the evening until night vapors are dissipated; we may be out in the daytime with comparative impunity where to pass a night would be almost certain disease. If forced to camp out, seek the highest and driest spot, put a good fire on the swamp side, and also, if possible, let trees intervene. Never go out on an empty stomach; just a cup of coffee and a crust may make a decided difference. Meet the earliest unfavorable symptoms with quinine—I should rather say, if unacclimated, anticipate them with this invaluable agent. Endeavor to maintain high health of all functions by the natural means of regularity and temperance in diet, exercise and repose. “TAKING COLD:” This vague “household word” indicates one or more of a long varied train of unpleasant affections, nearly always traceable to one or the other of only two causes: *sudden change* of temperature, and *unequal distribution* of temperature. No extremes of heat or cold can alone effect this result; persons frozen to death do not “take cold” during the process. But if a part of the body be rapidly cooled, as by evaporation from a wet article of clothing, or by sitting in a draught of air, the rest of the body remaining at an ordinary temperature; or if the temperature of the whole be suddenly changed by going out into the cold, or, especially, by coming into a warm room, there is much liability of trouble. There is an old saying—“when the air comes through a hole say your prayers to save your soul;” and I should think almost any one could get a “cold” with a spoonful of water on the wrist held to a key-hole. Singular as it may seem, sudden warming when cold is more dangerous than the reverse; every one has noticed how soon the handkerchief is required on entering a heated room on a cold day. Frost-bite is an extreme illustration of this. As the Irishman said on picking himself up, it was not the fall, but stopping so quickly, that hurt him; it is not the lowering of the temperature to the freezing point, but its subsequent elevation, that devitalizes the tissue. This is why rubbing with snow, or bathing in cold water, is required to restore safely a

frozen part; the arrested circulation must be very gradually reëstablished, or inflammation, perhaps mortification, ensues. General precautions against taking cold are almost self-evident, in this light. There is ordinarily little if any danger to be apprehended from wet clothes, so long as exercise is kept up; for the "glow" about compensates for the extra cooling by evaporation. Nor is a complete drenching more likely to be injurious than wetting of one part. But never sit still wet; and in changing, rub the body dry. There is a general tendency, springing from fatigue, indolence or indifference, to neglect damp feet; that is to say, to dry them by the fire; but this process is tedious and uncertain. I would say especially, off with the muddy boots and sodden socks at once—dry stockings and slippers, after a hunt, may make just the difference of your being able to go out again or never. Take care never to check perspiration; during this process the body is in a somewhat critical condition, and sudden arrest of the function may result disastrously—even fatally. One part of the business of perspiration is to equalize bodily temperature, and it must not be interfered with. The secret of much that is to be said about *bathing*, when heated, lies here. A person overheated, panting it may be, with throbbing temples and a *dry* skin, is in danger partly because the natural cooling by evaporation from the skin is denied, and this condition is sometimes not far from a "sunstroke." Under these circumstances, a person of fairly good constitution may plunge into the water with impunity—even with benefit. But if the body be already cooling by sweating, rapid abstraction of heat from the surface may cause internal congestion, never unattended with danger. Drinking ice-water offers a somewhat parallel case; even on stooping to drink at the brook, when flushed with heat, it is well to bathe the face and hands first, and to taste the water before a full draught. It is a well known excellent rule, not to bathe immediately after a full meal; because during digestion the organs concerned are comparatively engorged, and any sudden disturbance of the circulation may be disastrous. The imperative necessity of resisting drowsiness under extreme cold re-

quires no comment. In walking under a hot sun the head may be sensibly protected by green leaves or grass in the hat; they may be advantageously moistened, but not enough to drop about the ears. Under such circumstances the slightest giddiness, dimness of sight, or confusion of ideas, should be taken as a warning of possible sunstroke, instantly demanding rest, and shelter if practicable. HUNGER and FATIGUE are more closely related than they might seem to be; one is a sign that the fuel is out, and the other asks for it. Extreme fatigue, indeed, destroys appetite; this simply means, temporary incapacity for digestion. But even far short of this, food is more easily digested, and better relished after a little preparation of the furnace. On coming home tired it is much better to make a leisurely and reasonably nice toilet than to eat at once, or to lie still thinking how tired you are; after a change and a wash you will feel like a "new man," and go to table in capital state. Whatever dietetic irregularities a high state of civilization may demand or render practicable a normally healthy person is inconvenienced almost as soon as his regular meal-time passes without food; and few can work comfortably or profitably fasting over six or eight hours. Eat before starting; if for a day's tramp, take a lunch; the most frugal meal will appease if it do not satisfy hunger, and so postpone its urgency. As a small scrap of practical wisdom, I would add, keep the remnants of the lunch, if there are any; for you cannot always be sure of getting in to supper. STIMULATION: When cold, fatigued, depressed in mind, and on other occasions, you may feel inclined to resort to artificial stimulus. Respecting this many-sided theme I have a few words to offer of direct bearing on the collector's case. It should be clearly understood in the first place that a stimulant confers no strength whatever; it simply calls the powers that be into increased action at their own expense. Seeking real strength in stimulus is as wise as an attempt to lift yourself up by the boot-straps. You may gather yourself to leap the ditch and you clear it; but no such muscular energy can be sustained; exhaustion speedily renders further expenditure impossible.

## 42 SUGGESTIONS AND DIRECTIONS FOR FIELD-WORK.

But now suppose a very powerful mental impression be made, say the circumstance of a succession of ditches in front, and a mad dog behind; if the stimulus of terror be sufficiently strong, you may leap on till you drop senseless. Alcoholic stimulus is a parallel case, and is not seldom pushed to the same extreme. Under its influence you never can tell when you *are* tired; the expenditure goes on, indeed, with unnatural rapidity, only it is not felt at the time; but the upshot is you have all the original fatigue to endure and to recover from, *plus* the fatigue resulting from over excitation of the system. Taken as a fortification against cold, alcohol is as unsatisfactory as a remedy for fatigue. Insensibility to cold does not imply protection. The fact is the exposure is greater than before; the circulation and respiration being hurried, the waste is greater, and as sound fuel cannot be immediately supplied, the temperature of the body is soon lowered. The transient warmth and glow over, the system has both cold *and* depression to endure; there is no use in borrowing from yourself and fancying you are richer. Secondly, the value of any stimulus (except in a few exigencies of disease or injury) is in proportion, not to the intensity, but to the equableness and durability of its effect. This is one reason why tea, coffee, and articles of corresponding qualities, are preferable to alcoholic drinks; they work so smoothly that their effect is often unnoticed, and they "stay by" well; the friction of alcohol is tremendous in comparison. A glass of grog may help a veteran over the fence, but no one, young or old, can shoot all day on whiskey. I have had so much experience in the use of tobacco as a mild stimulant that I am probably no impartial judge of its merits: I will simply say I do not use it in the field, because it indisposes to muscular activity, and favors reflection when observation is required; and because temporary abstinence provokes the morbid appetite and renders the weed more grateful afterwards. Thirdly, undue excitation of any physical function is followed by corresponding depression, on the simple principle that action and reaction are equal; and the balance of health turns too easily to be wilfully disturbed.

Stimulation is a draft upon vital capital, when interest alone should suffice; it may be needed at times to bridge a chasm, but habitual living beyond vital income infallibly entails bankruptcy in health. The use of alcohol in health seems practically restricted to purposes of sensuous gratification on the part of those prepared to pay a round price for this luxury. The three golden rules here are—never drink before breakfast, never drink alone, and never drink bad liquor; their observance may make even the abuse of alcohol tolerable. Serious objections for a naturalist, at least, are that science, viewed through a glass, seems distant and uncertain, while the joys of rum are immediate and unquestionable; and that intemperance, being an attempt to defy certain physical laws, is therefore eminently unscientific.

## CHAPTER IV.

### REGISTRATION AND LABELLING.

§26. A MERE OUTLINE of a field naturalist's duties would be inexcusably incomplete without mention of these important matters; and, because so much of the business of collecting *must* be left to be acquired in the school of experience, I am the more anxious to give explicit directions whenever, as in this instance, it is possible to do so.

§27. RECORD YOUR OBSERVATIONS DAILY. In one sense the specimens themselves are your record—*primâ facie* evidence of your industry and ability; and if labelled, as I shall presently advise, they tell no small part of the whole story. But this is not enough; indeed, I am not sure that an ably conducted ornithological journal is not the better half of your operations. Under your editorship of labelling specimens tell what they know about themselves; but you can tell much more yourself. Let us look at a day's work:—You have shot and skinned so many birds and laid them away labelled. You have made observations about them before shooting, and have observed a number of birds that you did not shoot. You have items of haunts and habits, abundance or scarcity; of manners and actions under special circumstances, as of pairing, nesting, laying, rearing young; feeding, migrating and what not; various notes of birds are still ringing in your ears; and finally, you may have noted the *absence* of species you saw awhile before, or had expected to occur in your vicinity. Meteorological and topographical items, especially when travelling, are often of great assistance in explaining the occurrences and actions of birds. Now *you* know these things, but very likely no one else does; and you know them *at the time*, but you will not recollect a title of them in a few weeks or months, to say nothing of years. Don't trust your memory; it will trip you up; what

is clear now will grow obscure; what is found will be lost. Write down everything while it is fresh in your mind; write it out in full—time so spent now will be time saved in the end, when you offer your researches to the discriminating public. Don't be satisfied with a dry-as-dust item; clothe a skeleton fact, and breathe life into it with thoughts that glow; let the paper smell of the woods. There's a pulse in a new fact; catch the rhythm before it dies. Keep off the quicksands of mere memorandum—that means something “to be remembered,” which is just what you cannot do. Shun abbreviations; such keys rust with disuse, and may fail in after times to unlock the secret that should have been laid bare in the beginning. Use no signs\* intelligible only to yourself; your note-books may come to be overhauled by others whom you would not wish to disappoint. Be sparing of sentiment, a delicate thing, easily degraded to drivel; crude enthusiasm always hacks instead of hewing. Beware of literary infelicities; “the written word remains,” it may be, after you have passed away; put down nothing for your friend's blush, or your enemy's sneer; write as if a stranger were looking over your shoulder.

§28. ORNITHOLOGICAL BOOK-KEEPING may be left to your discretion and good taste in the details of execution. Each may consult his preferences for rulings, headings, and blank forms of all sorts, as well as particular modes of entry. But my experience has been that the entries it is advisable to make are too multifarious to be accommodated by the most ingenious formal ruling; unless, indeed, you make the conventional heading “Remarks” disproportionately wide, and commit to it everything not otherwise provided for. My preference is decidedly for a plain page. I use a strongly bound blank book, cap size, containing at least six or eight quires of

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\*This direction does not apply to a regular *code of signs*, which may be found extremely convenient. The Messrs. A. & E. Newton have, for example, perfected a system of symbols that leaves little if anything to be desired. See *Am. Nat.* 1872, p. 360.

good smooth paper ; but smaller may be needed for travelling, even down to a pocket note-book. I would not advise a multiplicity of books, splitting up your record into different departments ; let it be journal and register of specimens combined. (The registry of *your own collecting* has nothing to do with the register of your *cabinet of birds*, which is sure to include a proportion of specimens from other sources, received in exchange, donated, or purchased. I speak of this beyond.) I have found it convenient to commence a day's record with a register of the specimens secured, each entry consisting of a duplicate of the bird's label (see beyond), accompanied by any further remarks I have to offer respecting the particular specimens ; then to go on with the full of my day's observations, as suggested in the last paragraph. You thus have a "register of collections" in chronological order, toed off with an unbroken series of numbers, checked with the routine label-items, and continually interspersed with the balance of your ornithological studies. Since your private field-number is sometimes an indispensable clew in the authentication of a specimen after it has left your own hands, *never duplicate it*. If you are collecting other objects of natural history besides birds, still have but one series of numbers ; duly enter your mammal, or mineral, or whatever it is, in its place, with the number under which it happens to fall. Be scrupulously accurate with these and all other *figures*, as of dates and measurements. Always use black ink ; the "fancy" writing-fluids, even the useful carmine, fade sooner than black, while lead pencilling is never safe.

§29. LABELLING. This should *never* be neglected. It is enough to make a sensitive ornithologist shiver to see a specimen without the indispensable appendage—a label. I am sorry to observe that the routine labelling of most collections is far from being satisfactory. A well-appointed label is something more than a slip of paper with the bird's name on it, and is still defective, if, as is too often the case, only the locality and collector are added. A complete label records the following particulars :—1. *Title* of the survey, voyage, exploration,



or other expedition (if any), during which the specimen was collected. 2. *Name* of the person in charge of the same (and it may be remarked, that the less he really cares about birds, and the less he actually interests himself to procure them, the more particular he will be about this). 3. *Title* of the institution or association (if any) under the auspices or patronage of which the specimen was procured, or for which it is designed. 4. *Name of collector*; partly to give credit where it is due, but principally to fix responsibility, and authenticate the rest of the items. 5. *Collector's number*, referring to his note-book, as just explained; if the specimen afterwards forms part of a general collection it usually acquires another number by new registry; the collector's then becoming the "original," as distinguished from the "current," number. 6. *Locality*, perhaps the most important of all the items. A specimen of unknown or even uncertain origin is worthless or nearly so; while lamentable confusion has only too often arisen in ornithological writings from vague or erroneous indications of locality: I should say that a specimen "not authentic" in this particular had better have its *supposed* origin erased and be let alone. Nor will it do to say simply, for instance, "North America" or even "United States." Ornithologists generally know already the quarter of the globe from which a bird comes; the locality should be fixed down to the very spot. If this be obscure add the name of the nearest place to be found on a fairly good map, giving distance and direction. 7. *Date of collection*—day of the month, and year. Among other reasons for this may be mentioned the fact that it is often important to know what season a particular plumage indicates. 8. *Sex*, and if possible also *age*, of the specimen; an item that bespeaks its own importance. Ornithologists of all countries are agreed upon certain signs to indicate sex. These are ♂ for *male*, ♀ for *female*; the symbols respectively of Mars and Venus. Immaturity is often denoted by the sign ◦; thus, ♂ ◦, young male. Or, we may write ♀ ad., ♀ yg., for adult female, young female, respectively. It is preferable, however, to use the language of science, not our vernacular, and say ♂

*juv.* (*juvenis*, young). "*Nupt.*" signifies breeding plumage; "*hornot.*" means a bird of the year. 9. *Measurements* of length, and of extent of wings; the former can only be obtained approximately, and the latter not at all, from a prepared specimen. 10. *Color* of the eyes, and of the bill, feet, or other naked or soft parts, the tints of which may change in drying. 11. *Miscellaneous particulars*, such as contents of stomach, special circumstances of capture, vernacular name, etc. 12. *Scientific name of the bird*. This is really the least important item of all, though generally thought to take precedence. But a bird labels itself, so to speak; and nature's label may be deciphered at any time. In fact, I would enjoin upon the collector *not* to write out the supposed name of the bird in the field, unless the species is so well known as to be absolutely unquestionable. Proper identification, in any case to which the slightest doubt may attach, can only be made after critical study in the closet with ample facilities for examination and comparison. The first eight items, and the twelfth, usually constitute the face of a label; the rest are commonly written on the back. Labels should be of light card-board, or very stiff writing paper; they may be dressed attractively, as fancy suggests; the general items of a large number of specimens are best printed; the special ones must of course be written. Shape is immaterial; small "cards" or "tickets" are preferred by some, and certainly look very well when neatly appointed; but I think on the whole, that a shape answering the idea of a "slip" rather than a "ticket" is most eligible. A slip about three inches long and two-thirds of an inch wide will do very well for anything, from a hawk to a humming-bird. Something like the "shipping tags" used by merchants is excellent, particularly for larger objects. It seems most natural to attach the string to the *left-hand* end. The slip should be tied so as to swing just clear of the bird's legs, but *not* loose enough to dangle several inches, for in that case the labels are continually tangling with each other when the birds are laid away in drawers. The following diagrams show the face and back of the last label I happened to write; they represent the

size and shape that I find most convenient for general purposes; while the "legend" illustrates every one of the twelve items above specified.

Smithsonian	Explorations in Dakota.	Dr. Elliott Coues, U. S. A.	Institution.
	No. 2655.	Butes borealis (Gm.) V. ♀ juv.	
	Fort Randall, Mo. R. — Oct. 29, 1872.		

*Obverse.*

23.00 × 53.00 × 17.50. — Eyes yellowish gray; bill horn-blue, darker at tip; cere wax-yellow; tarsi dull yellowish; claws bluish-black. Stomach contained portions of a rabbit; also, a large tapeworm.

*Reverse.*

§30. DIRECTIONS FOR MEASUREMENT may be inserted here, as this matter pertains rightfully to the recording of specimens. The following instructions are repeated in substance from the "Key," p. 55; they apply not only to length and extent, but to the principal other dimensions, which may be taken at any time. For large birds a tape-line showing inches and fourths will do; for smaller ones, a foot-rule graduated for inches and eighths, or better, decimals to hundredths, must be used; and for all nice measurements the dividers are indispensable.— "*Length*:" Distance between the tip of the bill and end of the longest tail feather. Lay the bird on its back on the ruler on a table; take hold of the bill with one hand and of both legs with the other; pull with reasonable force to get the curve all out of the neck; hold the bird thus with the tip of the bill flush with one end of the ruler, and see where the end of the tail points. Put the tape-line in place of the ruler, in the same way, for larger birds.— "*Extent*:" Distance between the tips of the outspread wings. They must be *fully* outstretched, with the bird on its back, crosswise on the ruler, its bill pointing to your breast. Take hold of right and left metacarpus with the thumb and forefinger of your left and right

hand respectively, *stretch* with reasonable force, getting one wing-tip flush with one end of the ruler, and see how much the other wing-tip reaches. With large birds pull away as hard as you please, and use the table, floor or side of the room; mark the points and apply tape-line.—“*Length of wing:*” Distance from the angle formed at the (carpus) bend of the wing to the end of the longest primary. Get it with compasses for small birds. In birds with a convex wing do not lay the tape-line over the curve, but under the wing in a straight line. This measurement is the one called, for short, “the wing.”—“*Length of tail:*” Distance from the roots of the rectrices to the end of the longest one. Feel for the pope’s nose; in either a fresh or dried specimen there is more or less of a palpable lump into which the tail feathers stick. Guess as near as you can to the middle of this lump; place the end of the ruler opposite the point and see where the tip of the longest tail feather comes.—“*Length of bill:*” Some take the curve of the upper mandible; others the side of the upper mandible from the feathers; others the gape, etc. I take the *chord of the culmen*. Place one foot of the dividers on the culmen just where the feathers end; no matter whether the culmen runs up on the forehead, or the frontal feathers run out on the culmen, and no matter whether the culmen is straight or curved. Then with me the *length of the bill* is the shortest distance from the point just indicated to the tip of the upper mandible; measure it with the dividers. In a straight bill of course it is the length of the culmen itself; in a curved bill, however, it is quite another thing.—“*Length of tarsus:*” Distance between the joint of the tarsus with the leg above, and that with the first phalanx of the middle toe below. Measure it *always* with dividers, and in *front* of the leg.—“*Length of toes:*” Distance in a straight line along the upper surface of a toe is from the point last indicated to the root of the claw on top. Length of toe is to be taken *without* the claw, unless otherwise specified.—“*Length of the claws:*” Distance in a *straight line* from the point last indicated to the tip of the claw.—“*Length of head*” is often a convenient dimension for comparison with

the bill. Set one foot of the dividers over the base of the culmen (determined as above) and allow the other to slip just snugly down over the arch of the occiput; this is the required measurement.

## CHAPTER V.

### INSTRUMENTS, MATERIALS AND FIXTURES FOR PREPARING BIRDSKINS.

§31. INSTRUMENTS. The only indispensable instrument is a pair of scissors *or* a knife; although practically you want both of these, a pair of spring forceps and a knitting-needle, or some similar wooden or ivory object, yet I have made hundreds of birdskins consecutively without touching another tool. *Odi, puer, Persicos apparatus!* I always mistrust the emphasis of a collector who makes a flourish of instruments. You might be surprised to see what a meagre, shabby-looking kit our best taxidermists work with. Stick to your scissors, knife, forceps and needle. But you may as well buy, at the outset, a common dissecting case, just what medical students begin business with; it is very cheap, and if there are some unnecessary things in it, it makes a nice little box in which to keep your tools. The case contains, among other things, several scalpels, just the knives you want; a "cartilage-knife," which is nothing but a stout scalpel, suitable for large birds; the best kind of scissors for your purpose, with short blades and long handles — if "kneaded" at the hinge so much the better; spring forceps, the very thing; a blow-pipe, useful in many ways and answers well for a knitting-needle; and some little steel-hooks, chained together, which you may want to use. But you will also require, for large birds, a very heavy pair of scissors, or small shears, short-bladed and long-handled, and a stout pair of bone-nippers. Have some pins and needles; surgical needles, which cut instead of punching, are the best. Get a hone or strop, if you wish, and a feather duster. Use of scissors requires no comment; and I would urge their habitual employ instead of the knife-blade; I do nine-tenths of my cutting with scissors and find it much the easiest. A double-lever is twice as effective as a single one, and besides, you gain in cutting soft, yielding substances by opposing two blades. Moreover,

scalpels need constant sharpening—mine are generally too dull to cut much with, and I suppose I am like other people—while scissors stay sharp enough. The flat, thin ivory or ebony *handle* of the scalpel is about as useful as the blade. Fingernails, which were made before scalpels, are a mighty help. Forceps are almost indispensable for seizing and holding parts too small or too remote to be grasped by the fingers. The knitting-needle is wanted for a specific purpose noted beyond. The shears or nippers are only needed for what the ordinary scissors are too weak to do. Our instruments, you see now, are “a short horse soon curried.”

§32. MATERIALS. a. *For stuffing.* “What do you stuff ’em with?” is usually the first question of idle curiosity about taxidermy, as if that were the great point; whereas, the stuffing is so small a matter that I generally reply—“anything, except brickbats!” But if stuffing birds were the final cause of *Cotton*, that admirable substance could not be more perfectly adapted than it is to the purpose. Ordinary raw cotton batting or wadding is what you want. When I can get it I never think of using anything else for small birds. I would use it for all birds were expense no object. Here *tow* comes in; there is a fine, clean, bleached article of tow prepared for surgical dressings; this is the best, but any will do. Some say chop your tow fine; this is harmless but unnecessary. A crumpled newspaper, wrapped with tow, is first-rate for a large bird. Failing cotton or tow, any *soft, light, dry vegetable substance* may be made to answer, rags, paper, crumbled leaves, fine dried grass, soft fibrous inner bark, etc.; the down of certain plants, as thistle and silk-weed, makes an exquisite filling for small birds. But I will qualify my remark about brickbats by saying: *never put hair, wool, feathers, or any other ANIMAL substance in a birdskin*—far better leave it empty; for, as we shall see in the sequel, bugs come fast enough, without being invited into a snug nest. b. *For preserving.* ARSENIC\* is the

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\* “Arsenic”—not the pure metal properly so called, but arsenic of the shops, or arsenious acid.

great preservative. Use dry powdered arsenic, plenty of it, and nothing else. There is no substitute for arsenic worthy of the name, and no preparation of arsenic so good as the simple substance. Various kinds of "arsenical soap" were and may still be in vogue; it is a nasty greasy substance, not fit to handle; and although efficacious enough, there is a very serious hygienic objection to its use.\* Arsenic, I need not say, is a violent irritant poison, and must therefore be only *guarded*; but may be used with perfect impunity. It is a very *heavy* substance, not appreciably volatile at ordinary temperatures, and therefore not liable, as some suppose, to be breathed, to any perceptible, much less injurious, extent. It will not even at once enter the pores of healthy unbroken skin; so it is no matter if it gets on the fingers. The exceedingly minute quantity that may be supposed to find its way into the system in the course of time is believed by many competent physicians to be rather beneficial as a tonic. I will not commit myself to this; for, though I never feel better than when working daily with arsenic, I do not know how much my health is improved by the out-door exercise always taken at the same time. The simple precautions are, not to let it lie too long in contact with the skin, nor get into an abrasion, nor under the nails. It will convert a scratch or cut into a festering sore of some little severity; while if lodged under the nails it soon shows itself by soreness, increased by pressure; a white speck appears, then a tiny abscess forms, discharges and gets well in a few days. Your precautions really respect other persons

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\* "Strange as it may appear to some, I would say avoid especially all the so-called arsenical soaps; they are at best but filthy preparations; besides, it is a fact to which I can bear painful testimony that they are, especially when applied to a greasy skin, poisonous in the extreme. I have been so badly poisoned, while working upon the skins of some fat water birds that had been prepared with arsenical soap, as to be made seriously ill, the poison having worked into the system through some small wounds or scratches on my hand. Had pure arsenic been used in preparing the skins the effect would not have been *as bad*, although grease and arsenic are generally a blood poison in *some* degree; but when combined with "soap" the effect, at least as far as my experience goes, is much more injurious." MAYNARD, *Guide*, p. 12.

In endorsing this I would add, that the combination is the more poisonous, in all probability, simply because the soap, being detergent, mechanically, facilitates the entrance of the poison, without, however, chemically increasing its virulence.



more than yourself; the receptacle should be conspicuously labelled "POISON!" Arsenic is a good friend of ours; besides preserving our birds, it keeps busybodies and meddling folks away from the scene of operations, by raising a wholesome suspicion of the taxidermist's surroundings. It may be kept in the tin pots in which it is usually sold; but some shallower, *broader* receptacle is more convenient. A little drawer, say 6×6 inches, and an inch deep, to slip under the edge of the table, or a similar compartment in a large drawer, will be found handy. A salt-spoon, or little wooden shovel whittled like one, is nice to use it with, though, in effect, I always shovel it up with the handle of a scalpel. As stated, there is no substitute for arsenic; but at a pinch you can make temporary shift with the following, among other articles:—table salt, or saltpetre, or charcoal strewn plentifully; strong solution of corrosive sublimate, brushed over the skin inside; creosote; impure carbolic acid; these last two are quite efficacious, but they smell horribly for an indefinite period. A bird threatening to decompose before you can get at it to skin, may be saved for a while by squirting weak carbolic acid or creosote down the throat and up the fundament; or by disembowelling, and filling the cavity with powdered charcoal. *c. For cleansing: Gypsum\** is an almost indispensable material for cleansing soiled plumage. The mode of using it is indicated beyond. It is most conveniently kept in a shallow tray, say a foot square, and an inch or two deep, which had better, furthermore, slide under the table as a drawer; or form a compartment of a larger drawer. *Keep gypsum and arsenic in different looking receptacles*, not so much to keep from poisoning yourself, as to keep from *not* poisoning a birdskin. They look much alike, and skinning becomes such a mechanical process that you may get hold of the wrong article when your thoughts are wandering in the woods. Gypsum, like arsenic, has no worthy rival in its own field; some substitutes, in the order of

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\* "Gypsum" is properly native hydrated sulphate of lime; the article referred to is "plaster of Paris" or gypsum heated up to 260° F. (by which the water of crystallization is driven off) and then finely pulverized. When mixed with water it soon solidifies, the original hydrate being again formed.

their applicability, are:—calcined magnesia (very good, but too light—it floats in the air, and makes you cough); bicarbonate of magnesia; powdered chalk (“prepared chalk,” *creta præparata* of the drug shops is the best kind); fine wood-ashes; clean dry loam. No article, however powdery when dry, that contains a glutinous principle, as for instance gum arabic or flour, is admissible. d. *For wrapping*, you want a thin, pliable, strong paper; water-closet paper is the very best; newspaper is pretty good. For making the cones or cylinders in which birdskins may be set to dry, a stiffer article is required; writing paper answers perfectly.

§33. INDEPENDENT PARAGRAPH. Naturalists habitually carry a pocket lens, much as other people do a watch. You will find a magnifying glass very convenient in your search for the sexual organs of small birds when obscure, as they frequently are, out of the breeding season; in picking lice from plumage, to send to your entomological friend, who will very likely pronounce them to be of a “new species;” and for other purposes.

§34. FIXTURES. When travelling, your fixtures must ordinarily be limited to a collecting-chest; you will have to skin birds on the top of this, on the tail-board of a wagon, or on your lap, as the case may be. The chest should be very substantial—iron-bound is best; strong as to hinges and lock—and have handles. A good size is 30×18×18 inches. Let it be fitted with a set of trays; the bottom one say four inches deep; the rest shallower; the top one very shallow, and divided into compartments for your tools and materials, unless you fix these on the under side of the lid. Start out with all the trays full of cotton or tow. At home, have a room to yourself, if possible; taxidermy makes a mess to which your wife may object, and arsenic must not come in the way of children. At any rate have your own table. I prefer plain deal that may be *scrubbed* when required; great cleanliness is indispensable, especially when doing much work in hot weather, for the place soon smells sour if neglected. I use no special re-

ceptacle for offal, for this only makes another article to be cleaned; lay down a piece of paper for the refuse, and throw the whole away. A perfectly smooth surface is desirable. I generally have a large pane of window glass on the table before me. It will really be found advantageous to have a scale of inches scratched on the edge of the table; only a small part of it need be fractionally subdivided; this replaces the foot-rule and tape-line, just as the tacks of a dry goods counter answer for the yardstick. You will find it worth while to rig some sort of a derrick arrangement, which you can readily devise, on one end of the table, to hitch your hook to, if you hang your birds up to skin them; they should swing clear of everything. The table should have a large general drawer, with the little drawer for gypsum and arsenic already mentioned, unless these be kept elsewhere. Stuffing may be kept in a box under the table, and make a nice footstool; or in a bag slung to the table leg.

§35. QUERY: Have you cleansed the bird's plumage? Have you plugged the mouth, nostrils and vent? Have you measured the specimen and noted the color of the eyes, bill and feet, and prepared the labels, and made the entry in the register? Have you got all your apparatus within arm's length? Then we are ready to proceed.

## CHAPTER VI.

### HOW TO MAKE A BIRDSKIN.

#### *A. The regular process.*

§36. LAY THE BIRD on its back, the bill pointing to your right\* elbow. Take the scalpel like a pen, with edge of blade uppermost, and run a straight furrow through the feathers along the middle line of the belly, from end of the breast bone to the anus. Part the feathers completely, and keep them parted. †

Observe a strip of skin either perfectly naked, or only covered with short down; this is the line for incision. Take scissors, stick in the pointed blade just over the end of the breast bone, cut in a straight line thence to and *into* the anus; cut extremely shallow. ‡

Take the forceps in your left hand, and scalpel in your right, both held pen-wise, and with the forceps seize and lift up one of the edges of the cut skin, gently pressing away the belly-walls with the scalpel-point; no cutting is required; the skin may be peeled off without trouble. Skin away till you meet an obstacle; it is the thigh. Lay down the instruments; with your left hand take hold of the leg outside at the shank; put

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\* Reverse this and following directions for *position*, if you are left-handed.

† The motion is exactly like stroking the right and left sides of a moustache apart; you would never dress the hairs smoothly away from the middle line, by poking from ends to root; nor will the feathers stay aside, unless stroked away from base to tips.

‡ The skin over the belly is thin as tissue paper in a small bird; the chances are you will at first cut the walls of the belly too, opening the cavity; this is no great matter, for a pledget of cotton will keep the bowels in; nevertheless, try to divide skin only. Reason for cutting *into* anus: this orifice makes a nice natural termination of the incision, buttonhole-wise, and may keep the end of the cut from tearing around the root of the tail. Reason for beginning to cut *over* the edge of the sternum: the muscular walls of the belly are very thin, and stick so close to the skin that you may be in danger of attempting to remove them with the skin, instead of removing the skin from them; whereas, you cannot remove anything but skin from over the breast bone, so you have a guide at the start. You can tell skin from belly-walls, by its livid, translucent whiteness instead of redness.

your right forefinger under the raised flap of skin, and feel a bump; it is the *knee*; push up the leg till this bump comes into view; hold it so. Take the scissors in your right hand; tuck one blade under the concavity of the knee, and sever the joint at a stroke; then the thigh is left with the rest of the body, while the rest of the leg is dissevered and hangs only by skin. Push the leg further up till it has slipped out of its sheath of skin, like a finger out of a glove, down to the heel-joint. You have now to clear off the flesh and leave the bone there; you may scrape till this is done, but there is a better way. Stick the *closed* points of the scissors in among the muscles just below the head of the bone, then separate the blades just wide enough to grasp the bone; snip off its head; draw the head to one side; all the muscles follow, being there attached; strip them *downward* from the bone; the bone is left naked, with the muscle hanging by a bundle of tendons ("leaders") at its foot; sever these tendons collectively at a stroke.\* Draw the leg bone back into its sheath, and leave it. Repeat all the foregoing steps on the other side of the bird. If you are bothered by the skin-flaps settling against the belly-walls, insert a fluff of cotton. *Keep* the feathers out of the wound; cotton and the moustache movement will do it. Next you must sever the tail from the body, leaving a small "pope's-nose" for the feathers to stay stuck into. Put the bird in the hollow of your lightly closed left hand, tail upward, belly toward you; or, if too large for this, stand it on its breast on the table in similar position. Throw your left forefinger across the front of the tail, pressing a little backward; take the scissors, cut the end of the lower bowel free first, than peck away at bone and muscle with cautious snips,† till the tail-stump is dissevered from the rump, and the tail hangs only by skin. Now you have the rump-stump protruding naked; the legs

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\* This whole performance will occupy about three seconds, after practice; and you may soon discover you can nick off the head of the bone of a small bird with the thumb-nail.

† You will soon learn to do it all at one stroke; but you cannot be too careful at first; you are cutting right down on to the skin over the top of the pope's-nose, and if you divide this, the bird will part company with its tail altogether.

dangling on either side; the tail hanging loose over the bird's back between them. Lay down scissors; take up forceps\* in your left hand; with them seize and hold the stump of the rump; and with point or handle of scalpel in the other hand, with finger tips, or with thumb-nail (best), gently press down on and peel away skin.† No cutting will be required (usually) till you come to the wings: the skin peels off (usually) as easily as an orange rind; as fast as it is loosened, *evert* it; that is, make it continually turn itself more and more completely inside out. Work thus till you are stopped by the obtruding wings.‡ You have to sever the wing from the body at the shoulder, just as you did the leg at the knee, and leave it hanging by skin alone. Take your scissors,§ as soon as the upper arm is exposed, and cut through flesh and bone alike at one stroke, a little below (outside of) the shoulder-joint. Do the same with the other wing. As soon as the wings are severed the body has been skinned to the root of the neck; the process becomes very easy; the neck almost slips out of its sheath of itself; and if you have properly attended to keeping the feathers out of the wound and to continual ever-

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\* Or at this stage you may instead stick a hook into a firm part of the rump, and hang up the bird about the level of your breast; you thus have both hands free to work with. This is advisable with all birds too large to be readily taken in hand and will help you *at first*, with any bird. But there is really no use of it with a small bird, and you may as well learn the best way of working at first as afterward.

† The idea of the whole movement is exactly like ungloving your hand from the wrist, by turning the glove inside out to the very finger tips. Some people say, *pull off* the skin; I say *never pull* a bird's skin under any circumstances: *push it off*, always operating at lines of contact of skin with body, never upon areas of skins already detached.

‡ The elbows will get in your way before you reach the point of attack, viz., the shoulder, unless the wings were completely relaxed (as was essential, indeed, if you measured alar expanse correctly). Think what a difference it would make, were you skinning a man through a slit in the belly, whether his arms were stretched above his head, or pinned against his ribs. It is just the same with a bird. When properly relaxed the wings are readily pressed away toward the bird's head, so that the shoulders are encountered before the elbows.

§ Shears will be required to crash through a *large* arm-bone. Or, you may with the scalpel unjoint the shoulder. The joint will be found higher up and deeper among the breast muscles than you might suppose, unless you are used to carving fowls at table. With a small bird, you may snap the bone with the thumb-nail and tear asunder the muscles in an instant.

sion of the skin, you now find you have a naked body connected dumb-bell-wise by a naked neck to a cap of reversed skin into which the head has disappeared, from the inside of which the legs and wings dangle, and around the edges of which is a row of plumage and a tail.\* Here comes up an important consideration: the skin, plumage, legs, wings and tail together *weigh* something—enough to *stretch* † unduly the skin of the neck, from the small cylinder of which they are now suspended; the whole mass must be *supported*. For small birds, gather it in the hollow of your left hand, letting the body swing over the back of your hand out of the way; for large ones, rest the affair on the table or your lap. To skin the head, secure the body in the position just indicated, by confining the neck between your left thumb and forefinger; bring the right fingers and thumb to a cone over the head, and draw it out with gentle force; or, holding the head itself between the left thumb and forefinger, insert the handle of the scalpel between the skin and skull, and pry a little, to enlarge the neck-cylinder of skin enough to let the head pass. It will generally ‡ slip out of its hood very readily, as far as its greatest diameter; § there it sticks, being in fact pinned by the *ears*. Still holding the bird as before, with the point of the scalpel handled like a nut-picker, or with your thumb-nail, detach the delicate membrane that lines the ear-opening; do the same for the other ear. The skull is then shelled out to the *eyes*, and will skin no further of its own accord, being

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\* You find that the little straight cut you made along the belly has somehow become a hole larger than the greatest girth of the bird; be undismayed; it is all right.

† If you have up to this point properly *pushed* off the skin instead of *pulling* it, there is as yet probably no stretching of any consequence; but in skinning the head, which comes next, it is almost impossible for a beginner to avoid stretching to an extent involving great damage to the good looks of a skin. Try your utmost, by dexterity of manipulation at the lines of contact of skin with flesh and only there, to prevent *lengthwise* stretching. Crosswise distension is of no consequence—in fact more or less of it is usually required to skin the head, and it tends to counteract the evils of undue elongation.

‡ The special case of head too large for the calibre of the neck is treated beyond.

§ And you will at once find a great apparent increase of amount of free skin in your hand, owing to release and extension of all that was before shortened in length by circular distension, in enlargement of the neck-cylinder.

again attached by a membrane, around the border of the eye-socket. Holding the scalpel as before, run its edge around an arc (a semicircle is enough to let you into the orbit) of the circumference, dissevering the membrane from the bone. Reverse the scalpel, and scoop out the eyeball with the end of the handle; you bring out the eye betwixt the ball of your thumb and the handle of the instrument, tearing apart the optic nerve and conjunctival tissue, but taking care not to open the eyeball\* nor lacerate the eyelids. Do the same with the other eye. The head is then skinned far enough; there is no use of getting *quite* to the base of the bill. You have now to get rid of the brain and flesh of the nape and jaws,† and leave most of the skull in; the cranial dome makes the only perfect “stuffing” for the skin of the head. This is all done at once by only four particular cuts. Hold the head between your left thumb and fingers, the bill pointing towards you, the bird’s palate facing you; you observe a space bounded behind by the base of the skull where the neck joins, in front by the floor of the mouth, on either side by the prongs of the under jaw—these last especially prominent. Take the scissors; stick one blade just inside one branch of the lower jaw, thence into the eye-socket which lies below (the head being upside down) thence into the brain-box; make a cut parallel with the jaw, just inside of it, bringing the upper scissor blade perpendicularly downward crashing through the skull just inside of the angle of the jaw. Duplicate this cut on the other side. Connect the anterior ends of these cuts by a transverse one across the floor and roof of the mouth. Connect the posterior ends of the side cuts by one across the back of the skull near its base—just where the nape-muscle ceases to override the cra-

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\* An eyeball is much larger than it looks from the outside; if you stick the instrument straight into the socket, you may punch a hole in the ball and let out the water; a very disagreeable complication. Insinuate the knife-handle close to the rim of the socket, and hug the wall of the cavity throughout.

† You may of course at this stage cut off the neck at the nape, punch a hole in the base of the skull, dig out the brains, and scrape away at the jaw-muscles till you are satisfied or tired; an unnecessary job, during which the skin may have become dry and shrivelled and hard to turn right side out. The operation described in the text may require ten seconds, perhaps.



nium. You have enclosed and cut out a squarish-shaped mass of bone and muscle, and on gently pulling the neck (to which of course it remains attached), the whole affair comes out, bringing the brain with it, but leaving the entire roof of the skull supported on a scaffolding of jaw-bone. It only remains to skin the wings. Seize the arm-stump with fingers or forceps; the upper arm is readily drawn from its sheath as far as the elbow; but the wing must be skinned to the wrist (carpus—"bend of the wing"); yet it will not come out so easily, because the secondary quills grow to one of the forearm bones (the ulna) pinning down the skin the whole way along a series of points. To break up these connections, hold the upper arm firmly with the left thumb and forefinger, the convexity of the elbow looking towards you; press the right thumb-nail closely against the back edge of the ulna, and strip downward, scraping the bone with the nail the whole way.\* If you only hit the line of adhesion, there is no trouble at all about this. Now you want to leave in one of the two forearm bones, to preserve sufficiently the shape of the limb, but to remove the other, with the upper arm bone and all the flesh. It is done in a moment; stick the point of the scissors between the heads of the two forearm bones, and cut the hinder one (ulna) away from the elbow; then the other forearm bone (radius), bearing on its rear end the elbow and the whole upper arm, is to be stripped away from the ulna, taking with it the flesh of the forearm, and to be cut off at its far end close to the wrist-joint, one stroke severing the bone and all the tendons that pass over the wrist to the hand; then the ulna, bare of flesh, is alone left in, attached at the wrist. Draw gently on the wing from the outside till it slips into the natural position whence you everted it. Do the same for the other wing. This finishes the skinning process. The skin is now to be turned right side out. Begin any way you please, till you see the point of the bill reappearing among the feathers; seize it with fingers or forceps as convenient, and use it for gentle traction. But by no means pull it out by holding on to the rear end of the skin—

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\* For special case of wing too large to be handled thus, see beyond.

that would infallibly stretch the skin. Holding the bill, make a cylinder of your left hand and coax the skin backward with a sort of milking motion. It will come easily enough, until the final stage of getting the head back into its skull cap; this may require some little dexterity; but you cannot fail to get the head in, if you remember what you did to get it out. When this is fairly accomplished, you for the first time have the pleasure of seeing something that looks like a birdskin. Your next\* care is to apply arsenic. Lay the skin on its back, the opening toward you and wide spread, so the interior is in view. Run the scalpel-handle into the neck to dilate that cylinder until you can see the skull; find your way to the orifices of the legs and wings; expose the pope's-nose; thus you have not only the general skin surface, but all the points where some traces of flesh were left, fairly in view. Shovel in arsenic; dump some down the neck, making sure it reaches and plentifully besprinkles the whole skull; drop a little in each wing hole and leg hole; leave a small pile at the root of the tail; strew some more over the skin at large. The simple rule is, put in as much arsenic as will *stick* anywhere. Then close the opening, and shake up the skin; move the head about by the bill; rustle the wings and move the legs; this distributes the poison thoroughly. If you have got in more than is necessary, as you may judge by seeing it piled up dry, anywhere, hold the skin with the opening downward over the poison-drawer, and give it a flip and let the superfluous powder fall out. Now for the "make up," upon which the beauty of the preparation depends. First get the empty skin into good shape. Let it lie on its back; draw it straight out to its natural length. See that the skin of the head fits snugly; that the eyes, ears and jaws are in place. Expand the wings to make sure that the bone is in place, and fold them so that the quills override each other naturally; set the tail feathers shin-

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\* Some direct the poisoning to be done while the skin is still wrong side out; and it may be very thoroughly effected at that stage. I wait, because the arsenic generally strews over the table in the operation of reversing the skin, if you use as much as I think advisable; and it is better to have a cavity to put it *into* than a surface to strew it *on*.

glewise also; draw down the legs and leave them straddling wide apart. Give the plumage a preliminary dressing; if the skin is free from kinks and creases, the feathers come naturally into place; particular ones that may be awry should be set right, as may be generally done by stroking, or by lifting them free repeatedly, and letting them fall; if any (through carelessness) remain turned into the opening, they should be carefully picked out. Remove all traces of gypsum or arsenic with the feather duster. The stuffing is to be put in through the opening in the belly; the art is to get in just enough, in the right places. It would never do to push in pellets of cotton, as you would stuff a pillow-case, till the skin is filled up; no subsequent skill in setting could remove the distortion that would result. It takes just *four*\* pieces of stuffing — one for each eye, one for the neck, and one for the body; while it requires rather less than half as much stuffing as an inexperienced person might suppose. Take a shred of cotton that will make a tight ball as large as the bird's eye; stick it on the end of your knitting needle, and by twirling the needle whilst the cotton is confined in your finger tips, you make a neat ball. Introduce this through the belly-opening, into the eyesocket; if you have cut away skull enough, as already directed, it will go right in; disengage the needle with a reverse twirl, and withdraw it. Take hold of the bill with one hand, and with the forceps in the other, dress the eyelids neatly and naturally over the elastic substance within. Repeat for the other eye. Take next a shred of cotton that will roll into a firm cylinder rather less than the size of the bird's neck. Roll it on the needle much

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\*For any ordinary bird up to the size of a crow. It is often directed that the leg bones and wing bones be wrapped with cotton or tow. I should not think of putting anything around the wing bones of any bird up to the size of an eagle, swan or pelican. Examination of a skinned wing will show how extremely compact it is, except just at the shoulder. What you remove will never make any difference from the outside, while you would almost inevitably get in too much, not of the right shape, and make an awkward bulging no art would remedy; I say, then, leave the wings of all but the largest birds *empty*, and put in very little under any circumstances. As for legs, the whole host of small perching birds need no wrapping whatever; depend upon it you will make a nicer skin without wrapping. But large birds and those with very muscular or otherwise prominent legs must have the removal of flesh compensated for. I treat of these cases beyond.

as you did the eyeball, introduce it in the same way, and ram it firmly into the base of the skull; disengage the needle by twisting it the other way, and withdraw it, taking care not to dislodge the cotton neck. If now you peep into the skin you will see the end of this artificial neck; push it up against the skin of the breast—it must not lie down on the back between the shoulders.\* The body-wad comes next; you want to imitate the size and shape of the bird's trunk. Take a mass of cotton you think will be enough, and take about *half* of this; that will be plenty (cotton is very elastic). It should make a tolerably firm ball, rather egg-shaped, swelling at the breast, smaller behind. If you simply squeeze up the cotton, it will not stay compressed; it requires a motion something like that which bakers employ to knead dough into the shape of a loaf. Keep tucking over the borders of the cotton till the desired shape and firmness are attained. Insert the ball between the blades of the forceps in such way that the instruments confine the folded-over edges, and with a wriggling motion insinuate it aright into the body. Before relaxing the forceps, put your thumb and forefinger in the bird's armpits, and pinch the shoulders together till they almost touch; this is to make sure that there is no stuffing between the shoulders—the whole mass lying breastwards. Loosen the forceps and withdraw them. If the ball is rightly made and tucked in, the elasticity of the cotton will chiefly expend itself in puffing out the breast, which is just what is wanted. Be careful not to push the body *too far* in; if it impacts against the skin of the neck, this will infallibly stretch, driving the shoulders apart, and no art will remedy the unsightly gape resulting. You see I dwell on this

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\* Although a bird's neck is really, of course, in direct continuation of the backbone, yet the natural sigmoid curve of the neck is such that it virtually takes departure rather from the breast, its lower curve being received between the prongs of the merrythought. This is what we must imitate instead of the true anatomy. If you let the end of the neck lie between the shoulders, it will infallibly press them apart, so that the interscapular plumage cannot shingle over the scapular as it should, and a gaping place, showing down or even naked skin, will result. Likewise if the neck be made *too large* (the chances are that way, at first), the same result follows. These seemingly trifling points are very important indeed; I never made a decent birdskin till I learned to get the neck small enough, and to shove the end of it against the breast.

matter of the shoulders; the whole knack of stuffing correctly focusses just over the shoulders. If you find you have made the body too large, pull it out and make a smaller one; if it fits nicely about the shoulders but is too long to go in, or too puffy over the belly, let it stay, and pick away shreds at the open end till the redundancy is remedied. Your bird is now stuffed. Close the opening by bringing the edges of the original cut together. There is no use of sewing\* up the cut, for a small bird; if the stuffing is correct, the feathers will hide the opening, and if they do not, it is no matter. You are not making an object for a show case, but for a naturalist's cabinet. Supposing you to have been so far successful, little remains to be done; the skin already looks very much like a dead bird; you have only to give the finishing touches, and "set" it. Fixing the wings nicely is a great point. Fold each wing closely; see that the carpal bend is well defined, that the coverts show their several oblique rows perfectly, that all the quills override each other like shingles. Tuck the folded wings close up to the body—rather on the bird's back than along its sides; see that the wing tips meet over the tail (*under* the tail as the bird lies on its back); let the carpal angle nestle in the plumage; have the shoulders close together, so that the interscapulars shingle over the scapulars. If the wing be pressed in *too* tightly, the scapulars will rise up on end; there must be neither furrow nor ridge about the insertion of the wings; every thing must lie perfectly smooth. At this stage of the process, I generally lift up the skin gingerly, and let it slip head first through one hand after the other, pressing here or there to correct a deformity, or uniformly, to make the whole skin compact. The wings set, next bring the legs together, so that the bones within the skin lie parallel with each other; bend the heel-joint a little, to let the tarsi *cross* each other about their middle; lay them sidewise on the tail,

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\*But sew it up, if you please, though you may be perhaps giving the man who subsequently mounts the bird the trouble of ripping out the stitches. Stitches however, will not come amiss with a *large* bird. I generally, in such cases, *pin* the edges of the cut in one or more places.

so that the naturally flexed toes lie flat, all the claws mutually facing each other. See that the neck is perfectly straight, and, if anything, shortened rather than outstretched; have the crown of the head flat on the table, the bill pointing straight forward,\* the mandibles shut tightly.† Never attempt any “fancy” attitudes with a birdskin; the simpler and more compactly it is made up the better.‡ Finally, I say, hang over your bird (if you have time); dress better the feathers that were well dressed before; perfect every curve; finish caressingly, and put it away tenderly, as you hope to be shriven yourself when the time comes.

There are several ways of laying a birdskin. A common, easy and slovenly way is to thrust it head first into a paper *cone*; but it makes a hollow-chested, pot-bellied object unpleasant to see, and renders your nice work on the make-up futile. A paper *cylinder*, corresponding in calibre to the greatest girth of the birdskin, binds the wings well, and makes a good ordinary specimen—perhaps better than the average. Remarking that there are some detestable practices, such as hanging up a bird by a string through the nose (methods only to be men-

\* Exceptions. Woodpeckers, ducks and some other birds treated of in §39, are best set with the head flat on one side, the bill pointing obliquely to the right or left; owls, with the bill pointing straight up in the air as the bird lies on its back.

† If the mandibles gape, run a thread through the nostrils and tie it tightly under the bill. Or, since this injures the nostrils (and we frequently want to examine their structure) stick a pin in under the bill close to the gonys, drawing it obliquely into the palate. Sometimes the skin of the throat looks sunken betwixt the sides of the jaw. A mere shred of cotton introduced with forceps through the mouth will obviate this.

‡ Don't cock up the head, trying to impart a knowing air—it cannot be done, and only makes the poor bird look ridiculous. Don't lay the skin on one side, with the legs in perching position, and don't spread the wings—the bird will never perch nor fly again, and the suggestion is unartistic because incongruous. The only permissible departure from the rule of severe simplicity is when some special ornament, as a fine crest, may be naturally displayed, or some hidden markings are desired to be brought out, or a shape of tail or wing to be perpetuated; but in all such cases the “flowery” inclination should be sparingly and judiciously indulged. It is, however, frequently desirable to give some special set to *hide a defect*, as loss of plumage, etc.; this may often be accomplished very cunningly, with excellent result. No rules for this can be laid down, since the details vary in every case; but in general the weak spot may be hidden by contracting the skin of the place and then setting the bird in an attitude that naturally corresponds, thus making a virtue of necessity.

tioned to be condemned), I will tell you the easiest and best way, by which the most elegant and tasteful results are almost necessarily secured. The skins are simply laid away in cotton, just as they come from your hands. Take a considerable wad of cotton, make a "bed" of it, lay the specimen in, and tuck it up nicely around the edges. In effect, I generally take a thin sheet of cotton wadding, the sizing of which confers some textile consistency, and wrap the bird completely but lightly in it. By loosening or tightening a trifle here or there, laying down a "pillow" or other special slight pressure, the most delicate contour-lines may be preserved with perfect fidelity. Unnecessary pother is sometimes made about *drying* skins; the fact being that under ordinary circumstances they could not be kept from drying perfectly; and they dry in exactly the shape they are set, if not accidentally pressed upon. At sea, however, or during unusually protracted wet weather, they of course dry slowly, and may require some attention to prevent mildew, and even souring, especially in the cases of very large, thick-skinned or greasy specimens. Thorough poisoning, and drying by a fire, or placing in the sun, will always answer. Very close packing retards drying. When travelling or operating under other circumstances requiring economy of space, you must not expect to turn out your collection in elegant order. Perfection of contour-lines can only be secured by putting each specimen away by itself; undue pressure is always liable to produce unhappily *outré* configuration of a skin. Trays in a packing box are of great service in limiting possibilities of pressure; they should be shallow; for one four inches deep will take a well stuffed hen hawk, for example, or accommodate 3-6 sparrows a-top of each other. It is well to sort out your specimens somewhat according to size, to keep heavy ones off little ones; though the chinks around the former may usually be economized with advantage by packing in the less valuable or the less neatly prepared of the latter. When limited to a travelling chest, I generally pass in the skins as fast as made, packing them "solid" in one sense, yet hunting up a nice resting place for each. If each rests in its

own cotton coffin, it is astonishing how close they may be laid without harm; and how many will go in a given space—a tray  $30 \times 18 \times 4$  inches will easily hold three hundred and fifty birds six inches long. As a tray fills up, the drier ones first put in may be submitted to more pressure. A skin originally dried in good shape may subsequently be pressed perfectly flat without material injury; the only thing to avoid being *contortion*. The whole knack of packing birds corresponds to that of filling a trunk *solidly* full of clothes—as may easily be done without damage to an immaculate shirt-front. Finally, I would say, never put away a bird unlabelled, not even for an hour; you may forget it, or die. Never tie a label to a bird's bill, wing or tail; tie it securely to *both* legs where they cross, and it will be just half as liable to become detached as if tied to one leg only. Never paste a label, or even a number, on a bird's plumage. Never put in glass eyes before mounting. Never paint or varnish a bird's bill or feet. Never replace missing plumage of one bird with the feathers of another—no, not even if the birds came out of the same nest.

*B. Special Processes; Complications and Accidents.*

§37. THE foregoing method of procedure is a routine practice applicable to three-fourths if not nine-tenths of the "general run" of birds. But there are several cases requiring a modification of this programme; while several circumstances may tend to embarrass your operations. The principal special conditions may therefore be separately treated to your advantage.

§38. SIZE. Other things being equal, a large bird is more difficult to prepare than a small one. In one case, you only need a certain delicacy of touch, easily acquired and soon becoming mechanical; in the other, demand on your strength may be made, till your muscles ache. It takes longer, too;\*

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\* The reader may be curious to know something of the statistics on this score—how long it ought to take him to prepare an ordinary skin. He can scarcely imagine, from his first tedious operations, how expert he may become, not only in



I could put away a dozen sparrows in the time I should spend over an eagle, and I would rather undertake a hundred humming birds than one ostrich. For "large" birds, say anything from a hen hawk upward, various special manipulations I have directed may be foregone, while however you observe their general drift and intent. You may open the bird as directed, or, turning it tail to you, cut with a knife.\* Forceps are rarely required — there is not much that is too small to be taken in hand. As soon as the tail is divided, hang up the bird by the rump, so you will have both hands free. Let it swing clear of the wall or table, at any height most convenient. The steel hooks of a dissecting case are not always large enough; use a stout fish-hook with the barb filed off. Work with your nails, assisted by the scalpel if necessary. I know of no bird, and I think there is none in this country at least, the skin of which is so internally adherent by fibrous or muscular tissue as to require actual dissecting throughout; a pelican comes perhaps as near this as any; but in many cases the knife may be constantly employed with advantage. Use it with long clean

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beauty of result, but in rapidity of execution. I have seen taxidermists make good small skins at the rate of ten an hour; but this is extraordinary. The quickest work I ever did myself was eight an hour, or an average of seven and a half minutes apiece, and fairly good skins. But I picked my birds, all small ones, well shot, labelled, measured and plugged beforehand, so that the rate of work was exceptional besides including only the actual manipulations from first cut to laying away. No one averages eight birds an hour, even excluding the necessary preliminaries of cleansing, plugging, etc. Four birds an hour, everything included, is good work. A very eminent ornithologist of this country, and an expert taxidermist, once laid a whimsical wager, that he would skin and stuff a bird before a certain friend of his could pick all the feathers off a specimen of the same kind. I forget the time, but he won, and his friend supped that night on some very tough game!

\* Certain among larger birds are often opened elsewhere than along the belly — with what advantage I cannot say from my own experience. Various water birds, such as loons, grebes, auks, gulls and ducks (in fact any swimming bird with dense under plumage) may be opened along the side by a cut under the wings from the shoulder over the hip to the rump; the cut is completely hidden by the make-up, and the plumage is never ruffled. But I see no necessity for this; for, as a rule, the belly opening can, if desired, be completely effaced with due care; though a very greasy bird with white under plumage generally stains where opened, in spite of every precaution. Such birds as loons, grebes, cormorants and penguins are often opened by a cut across the fundament from one leg to the other; their conformation in fact suggests and favors this operation. I have often seen water birds slit down the back; but I consider it very poor practice.

sweeping strokes, hugging the skin rather than the body. The knee and shoulder commonly require disarticulation, unless you use bone-nippers or strong shears; the four cuts of the skull may presuppose a very able-bodied instrument—even a chisel. The wings will give you the most trouble, and they require a special process; for you cannot readily break up the adhesions of the secondary quills to the ulna, nor is it desirable that very large feathers should be deprived of this natural support. Hammer or nip off the great head of the upper arm-bone, just below the insertion of the breast muscles; clean the rest of that bone and leave it in. Tie a string around it (what sailors call “two half hitches” gives a secure hold on the bony cylinder), and tie it to the other humerus, inside the skin, so that the two bones shall be rather less than their natural distance apart. After the skin is brought right side out, attack the wings thus: spread the wing under side uppermost, and secure it on the table by driving a tack or brad through the wrist-joint; this fixes the far end, while the weight of the skin steadies the other. Raise a whole layer of the under wing coverts, and make a cut in the skin thus exposed, from elbow to wrist, in the middle line between the two forearm bones. Raise the flaps of skin, and all the muscle is laid bare; it is to be removed. This is best done by lifting each muscle from its bed separately, slipping the handle of the scalpel under the individual bellies; there is little if any bony attachment except at each end, and this is readily severed. Strew in arsenic; a little cotton may be used to fill the bed of muscle removed from a *very* large bird; bring the flaps of skin together, and smooth down the coverts; you need not be particular to sew up the cut, for the coverts will hide the opening; in fact, the operation does not show at all after the make-up. Staffing of large birds is not commonly done with only the four pieces already directed. The eyeballs, and usually the neck-cylinder, go in as before; the body may be filled any way you please, provided you do not put in too much stuffing nor get any between the shoulders. All large birds had better have the leg bones wrapped to nearly natural size. Observe

that the leg-muscles do not form a cylinder, but a cone; let the wrapping taper naturally from top to bottom. Attention to this point is necessary for all large or medium sized birds with naturally prominent legs. The large finely feathered legs of a hawk, for example, ought to be well displayed; with these birds, and also with rails, etc., moreover, imitate the bulge of the thigh with a special wad laid inside the skin. Large birds commonly require also a special wad introduced by the mouth, to make the swell of the throat; this wad should be rather fluffy than firm. As a rule do not fill out large birds to their natural dimensions; they take up too much room. Let the head, neck and legs be accurately prepared, but leave the main cavity one-third if not one-half empty; no more is required than will fairly smooth out creases in the skin. Reduce bulk rather by flattening out than by general compression. Use tow instead of cotton; and if at all short of tow, economize with paper, hay, etc., at least for the deeper portions of the main stuffing. Large birds may be "set" in a great quantity of tow; wrapped in paper, much like any other parcel; or simply left to dry on the table, the wings being only supported by cushioning or other suitable means.

§39. SHAPE. Some special configurations have been noticed in the last paragraph, prematurely perhaps, but leading directly up to further considerations respecting *shape* of certain birds as a modifying element in the process of preparation. As for skinning, there is one extremely important matter. Most ducks, many woodpeckers, flamingoes, and doubtless some others, with which I am not familiar, cannot be skinned in the usual way, because the head is too large for the calibre of the neck and cannot be drawn through. In such cases, skin as usual to the base of the skull, cut off the head there (inside the skin of course), and operate upon it, after turning the skin right side out, as follows:—Part the feathers carefully in a straight line down the back of the skull, make a cut through the skin, just long enough to permit the head to pass, draw out the skull through this opening, and dress it as already

directed. Return it, draw the edges of the cut nicely together, and sew up the opening with a great many fine stitches. Simple as it may appear, this process is often embarrassing, for the cut has an unhappy tendency to wander about the neck, enlarging itself even under the most careful manipulation; while the feathers of the parts are usually so short, that it is difficult to efface all traces of the operation. I consider it very disagreeable; but for ducks I know of no alternative. I have however found out a way to avoid it with woodpeckers, excepting the very largest: it is this:—Before skinning, part the eyelids, and plunge the scalpel right into the eyeballs; seize the cut edge of the ball with the forceps, and pull the eye right out. It may be dextrously done without spilling the eye water on the plumage; but, for fear of this, previously put a little pile of plaster on the spot. Throw arsenic into the socket, and then fill it with cotton poked in between the lids. The eyes are thus disposed of. Then, in skinning, when you come to the head, dissever it from the neck and work the skull as far out as you can; it may be sufficiently exposed, in all cases, for you to gouge out the base of the skull with the scissors, and get at the brain to remove it. Apply an extra large dose of arsenic, and you will never hear from what jaw-muscle has been left in. In all these cases, as already remarked, the head is preferably set lying on one side, with the bill pointing obliquely to the right or left. Certain birds require a special mode of *setting*; these are, birds with very long legs or neck, or both, as swans, geese, pelicans, cormorants, snakebirds, loons, and especially cranes, herons, ibises and flamingoes. Long legs should be doubled completely on themselves by bending at the heel-joint, and either tucked under the wings, or laid on the under surface; the chief point is to see that the toes lie flat, so that the claws do not stick up, to catch in things or get broken off. A long neck should be carefully folded; not at a sharp angle with a crease in the skin, but with a short curve, and brought round either to the side of the bird or on its breast, as may seem most convenient. The object is to make a “bale” of the skin as nearly as may be,

and when it is properly effected it is surprising what little space a crane, for instance, occupies. But it is rarely, if ever, admissible to bend a tail back on the body however inconveniently long it may be. Special dilations of skin, like the pouch of a pelican, or the air sacs of a prairie-hen, may be moderately displayed.

§40. THIN SKIN. LOOSE PLUMAGE. It is astonishing how much resistance is offered by the thin skin of the smallest bird. Though no thicker than tissue paper, it is not very liable to tear if deftly handled; yet a rent once started often enlarges to an embarrassing extent if the skin be stretched in the least. Accidental rents, and enlargements of shot-holes, should be neatly sewn up, if occurring in an exposed place; but in most cases the plumage may be set to hide the openings. The trogons are said to have remarkably thin and delicate skin; I have never handled one in the flesh. Among our birds, the cardinal grosbeak has, I think, about the tenderest skin. The obvious indication in all such cases is simply a little extra delicacy of manipulation. In skinning most birds, you should not loose more than a feather or two, excepting those loosened by the shot. Pigeons are peculiar, among our birds, for the very loose insertion of their plumage; you will have to be particularly careful with them and in spite of all your precautions a good many feathers will probably drop. Stripping down the secondary quills from the forearm, in the manner already indicated, will so almost invariably set these feathers free from the skin that I recommend you not to attempt it, but to dress the wings as prescribed for large birds.

§41. FATNESS. Fat is a substance abhorred of all dissectors; always in the way, embarrassing operations and obscuring observations, while it is seldom worth examination after its structure has once been ascertained. It is particularly obnoxious to the taxidermist, since it is liable to soil the plumage during skinning, and also to soak into the feathers afterwards; and greasy birdskins are never pleasing objects. A

few birds never seem to have any fat; some, like petrels, are always oily; at times, especially in the indolent autumn season, when birds have little to do but feed, the great majority acquire an *embonpoint* doubtless to their own satisfaction, but to the taxidermist's discomfort. In all such cases, gypsum should be lavishly employed. Strew plaster plentifully from the first cut, all through the operation; dip your fingers in it frequently, as well as your instruments. The invaluable absorbent will deal with most of the "running" fat. When the skin is completely reversed remove as much of the solid fat as possible; it is generally found occupying the areolar tissue of particular definite tracts, and most of it may usually be peeled or flaked off in considerable masses. Since the soft and oozy state of most birds' fat at ordinary temperatures may be much improved by cold, it will repay you to leave your birds on ice for a while before skinning, if you have the means and time to do so; the fat will become quite firm. There is a device for preventing or at any rate lessening the soiling of the plumage so apt to occur along the line of your incision; it is invaluable in all cases of white plumage. Take a strip of cloth of greater width than the length of the feathers, long enough to go up one side of the cut and down the other. Sew this closely to the skin all around the cut, and it will form an apron to guard the plumage. You will too frequently find that a bird, prepared without soiling and laid away apparently safe, afterwards grows greasy; if the plumage is white, it soon becomes worse than ever by showing dust that the grease catches. Perhaps the majority of such birds in our museums show the dirty streak along the belly. The reason is, that the grease has oozed out along the cut and wherever else the skin has been broken, and infiltrated the plumage, being drawn up apparently by capillary attraction, just as a lampwick "sucks up" oil. Sometimes, without obviously soiling the plumage, the grease will run along the thread that ties the label, and make a uniformly transparent piece of "oil-paper." I have no remedy to offer for this gradual infiltration of the plumage. It will not wash out, even with soap and water. Possibly

careful and persistent treatment with an ether might be effective, but I am not prepared to say it would be. Removal of all fat that can be got off during skinning with a liberal use of plaster will in a measure prevent a difficulty that remains incurable.

§42. BLOODSTAINS, ETC. In the nature of the case, this complication is of continual occurrence; fortunately it is easier dealt with than greasiness. Much may be done, in the field, to prevent bloodying of the plumage, as already said. A little blood does not show much on a dark plumage; but it is of course conspicuous on light or white feathers. Dried blood may often be scraped off, in imitation of the natural process by which a bird cleanses its plumage with the bill; or be pulverized by gently twiddling the feathers between the fingers, and then blown off. But feathers may by due care be *washed* almost as readily as clothing; and we must ordinarily resort to this to remove all traces of blood, especially from white surfaces. If properly dried they do not show the operation. With a soft rag or pledget of cotton dipped in warm water bathe the place assiduously, pressing down pretty hard, only taking care to stroke the feathers the right way, so as not to crumple them, until the red color disappears; then you have simply a wet place to deal with. Press gypsum on the spot; it will cake; flake it off and apply more, till it will no longer stick. Then raise the feathers on a knife blade and sprinkle gypsum in among them; pat it down and shake it up, wrestling with the spot till the moisture is entirely absorbed. Two other fluids of the body will give you occasional annoyance—the juices of the alimentary canal, and the eye-water. Escape of the former by mouth, nostrils or vent is preventable by plugging these orifices, and its occurrence is inexcusable. But shot often lacerates the gullet, crop and bowels, and though nothing may flow at the time, subsequent jolting or pressure in the game bag causes the escape of fluids: a seemingly safe specimen may be unwrapped to show the whole belly plumage a sodden brown mass. Such accidents should be treated pre-

cisely like bloodstains; but it is to be remarked that these stains are not seldom indelible, traces usually persisting in white plumage at least in spite of our best endeavors. Eye-water, insignificant as it may appear, is often a great annoyance, this liquor is slightly glairy, or rather glassy, and puts a sort of sizing on the plumage, difficult to efface—the more so since the soiling necessarily occurs in a conspicuous place, where the plumage is too scanty and delicate to bear much handling. It frequently happens that a lacerated eyeball, by the elasticity of the coats, or adhesion of the lids, retains its fluid till this is pressed out in manipulating the parts; and recollecting how the head lies buried in plumage at that stage of the process, it will be seen that not only the head, but much of the neck and even the breast may become wetted. If the parts are extensively soaked, the specimen is almost irreparably damaged, if not ruined. Plaster will absorb the moisture, but much of the sizing may be retained on the plumage; therefore, though the place seems simply wet, it should be thoroughly washed with water before the gypsum is applied. I always endeavor to prevent the accident; if I notice a lacerated eyeball, I extract it before skinning, in the manner described for woodpeckers. Miscellaneous stains, from the juices of plants, etc., may be received; all such are treated on general principles. Blood on the beak and feet of rapacious birds, mud on the bill and legs of waders, etc., etc., may be washed off without the slightest difficulty. A land bird that has fallen in the water should be recovered as soon as possible, picked up *by the bill*, and shaken; most of the water will run off, unless the plumage is completely soaked. It should be allowed to dry just as it is, without touching the plumage, before being wrapped and bagged. If a bird fall in soft mud, the dirt should be scraped or snapped off as far as this can be done without plastering the feathers down, and the rest allowed to dry; it may afterward be rubbed fine and dusted off, when no harm will ensue, except to white feathers which may require washing.



§43. MUTILATION. You will often be troubled, early in your practice, with broken legs and wings, and various lacerations; but the injury must be very severe (such as the carrying away of a limb, or blowing off the whole top of a head) that cannot be in great measure remedied by care and skill. Suppose a little bird, shot through the neck or small of the back, comes apart while being skinned; you have only to remove the hinder portion, be that much or little, and go on with the rest as if it were the whole. If the leg bone of a small bird be broken near the heel, let it come away altogether—it will make little if any difference. In case of the same accident to a large bird that ought to have the legs wrapped, whittle out a peg and stick it in the hollow stump of the bone; if there is no stump left file a piece of stout wire to a point and stick it into the heel joint. If the forearm bone that you usually leave in a small bird is broken, remove it and leave the other in; if both are broken, do not clean the wings so thoroughly that they become detached; an extra pinch of arsenic will condone the omission. In a large bird, if both bones of the forearm are broken, splint them with a bit of wood laid in between so that one end hitches at the elbow, the other at the wrist. A humerus may be replaced like a leg bone, but this is rarely required. If the skull be smashed, save the pieces, and leave them if you can; if not, imitate the arch of the head with a firm cotton-ball. A broken tarsus is readily splinted with a pin thrust up through the sole of the foot: if too large for this, use a pointed piece of wire. There is no mending a bill when part of it is shot away, for I think the replacing of part by putty, stucco, etc., inadmissible; but if it be only fractured, the pieces may usually be retained in place by winding with thread, or with a touch of glue or mucilage. It is singular, by the way, what unsightliness results from a very trifling injury to the bill—much, I suppose, as a boil on a person's nose is peculiarly deplorable. I have already hinted how artfully various weak places in a skin, due to mutilation or loss of plumage, may be hidden.

§44. DECOMPOSITION. It might seem unnecessary to speak of what may be *smelled out* so readily as animal putrescence, but there are some useful points to be learned in this connection, besides the important sanitary precautions that are to be deduced. Immediately after death the various fluids of the body begin to "settle" (so to speak) and shortly after, the muscular system as a rule becomes fixed in what is technically called *rigor mortis*. This stiffening usually occurs as the animal heat dies away; but its onset, and especially its duration, is very variable, according to circumstances, such as cause of death; although in most cases of sudden violent death of an animal in previous good health, it seems to depend chiefly upon temperature, being transient and imperfect, or altogether wanting in hot weather. As it passes off, the whole system relaxes, and the body soon becomes as "limp" as at the moment of death. This is the period immediately preceding decomposition—in fact, it may be considered as the stage of incipient putridity; it is very brief in warm weather; and it should be seized as the last opportunity of preparing a bird without inconvenience and even danger. If not skinned at once, putrescence becomes established; it is indicated by the effluvia (at the outset "sour," but rapidly acquiring a variety of disgusting odors); by the distension of the abdomen with gaseous products of decomposition; by a loosening of the cuticle, and consequently of the feathers; and by other signs. If you part the feathers of a bad-smelling bird's belly to find the skin swollen and livid or greenish, while the feathers come off at a touch, the bird is too far gone to be recovered without trouble and risk that no ordinary specimen warrants. It is a singular fact that this early putrescence is more poisonous than utter rottenness; as physicians are aware, a post-mortem examination at this stage, or even before it, involves more risk than their ordinary dissecting-room experience. It seems that both natural and pathological poisons lose their early virulence by resolution into other products of decay. The obvious deduction from all this is to skin your birds soon enough. Some say they are best skinned per-

fectly fresh, but I see no reason for this ; when I have time to choose, I take the period of rigidity as being preferable on the whole ; for the fluids have then "settled," and the limbs are readily relaxed by manipulation. If you have a large bag to dispose of, and are pressed for time, set them in the coolest place you can find, preferably on ice ; a slight lowering of temperature may make a decided difference. Disembowelling, which may be accomplished in a moment, will materially retard decomposition. Injections of creosote or dilute carbolic acid will arrest decay for a time, for an indefinitely long period if a large quantity of these antiseptics be employed. When it becomes desirable (it can never be *necessary*) to skin a putrescent bird, great care must be exercised not only to accomplish the operation, but to avoid danger. I must not, however, unconsciously lead you to exaggerate the risk, and will add that I think it often overrated. I have probably skinned birds as "gamey" as any one has, and repeatedly, without being conscious of any ill effects. I am sure that no poison, ordinarily generated by decomposition of a body *healthy* at death, can compare in virulence with that commonly resulting after death by many diseases. I also believe that the gaseous products, however offensive to the smell, are innocuous as a rule. The danger practically narrows down to the absorption of fluids through an abraded surface ; the poison is rarely taken in by natural pores of healthy skin, if it remain in contact but a short time. Cuts and scratches may be closed with a film of collodion, or covered with isinglass or court plaster, or protected by rubber cots on the fingers. The hands should, of course, be washed with particular care immediately after the operation, and the nails scrupulously dressed. Having never been poisoned (to my knowledge), I cannot give the symptoms from personal experience ; but I will quote from Mr. Maynard.

"In a few days numerous pimples, which are exceedingly painful, appear upon the skin of the face and other parts of the person and, upon those parts where there is chafing or rubbing, become large and deep sores. There is a general languor and, if badly poisoned, complete prostration results ; the slight-

est scratch becomes a festering sore. Once poisoned in this manner (and I speak from experience), one is never afterward able to skin any animal that has become in the least putrid, without experiencing some of the symptoms above described. Even birds that you handled before with impunity, you cannot now skin without great care. The best remedy in this case is, as the Hibernian would say, not to get poisoned, . . . bathe the parts frequently in cold water; and, if chafed, sprinkle the parts after bathing, with wheat flour. These remedies, if persisted in, will effect a cure, if not too bad; then, medical advice should be procured without delay.”\*

§45. HOW TO MOUNT BIRDS. As some may not improbably procure this volume with a reasonable expectation of being taught to *mount* birds, I append the required instructions, although the work only professes to treat of the preparation of skins for the cabinet. As a rule, the purposes of science are best subserved by *not* mounting specimens; for display, the only end attained, is not required. I would strongly advise you not to mount your rarer or otherwise particularly valuable specimens; select for this purpose nice, pretty birds of no special scientific value. The principal objections to mounted birds are, that they take up altogether too much room, require special arrangements for keeping and transportation, and cannot be handled for study with impunity. Some might suppose that a mounted bird would give a better idea of its figure and general aspect than a skin; but this is only true to a limited extent. Faultless mounting is an art really difficult, acquired by few; the average work done in this line shows something of caricature, ludicrous or repulsive, as the case may be. To copy nature faithfully by taxidermy requires not only long and close study, but an artistic sense; and this last is a rare

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\* Avoid all mechanical irritation of the inflamed parts; touch the parts that have ulcerated with a stick of lunar caustic; take a dose of salts; use syrup of the iodide of iron, or tincture of the chloride of iron, say thirty drops of either, in a wineglass of water, thrice daily; rest at first, exercise gradually as you can bear it; and skin no birds till you have completely recovered.

gift. Unless you have at least the germs of the faculty in your composition your taxidermal success will be incommensurate with the time and trouble you bestow. My own taxidermal art is of a low order, decidedly not above average; although I have mounted a great many birds that would look well enough by the side of ordinary museum work, few of them have entirely answered my ideas. A live bird is to me such a beautiful object that the slightest taxidermal flaw in the effort to represent it is painfully offensive; perhaps this makes me place the standard of excellence too high for practical purposes. I like a good honest birdskin that does not pretend to be anything else; it is far preferable to the ordinary taxidermal abortions of the show-cases. But if, after the warnings that I mean to convey in this paragraph, you still wish to try your hand in the higher department of taxidermy, I will explain the whole process as far as manipulation goes; the art you must discover in yourself.

The operation of skinning is precisely the same as that already given in detail; then, instead of stuffing the skin as directed above, to lie on its back in a drawer, you have to stuff it so that it will stand up on its feet and look as much like a live bird as possible. To this end a few additional implements and materials are required. These are:—*a*, annealed wire of various numbers; it may be iron or brass, but must be perfectly annealed, so as to retain no elasticity or “spring;” *b*, several files of different sizes; *c*, some slender, straight brad awls; *d*, cutting pliers; *e*, setting needles, merely sewing or darning needles stuck in a light wooden handle, for dressing individual feathers; *f*, plenty of pins\* and sewing thread; *g*, an assortment of glass eyes. (The fixtures and decorations are noticed, beyond, as occasion for their use arises.)

There are two principal methods of mounting, which may be respectively styled *soft* stuffing, and *hard* stuffing. In the former, a wire framework, consisting of a single anterior

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\* The long, slender insect pins used by entomologists are the best.

piece passing in the middle line of the body up through the neck and out at the top of the head, is immovably joined behind with two pieces, one passing through each leg: around this naked forked frame soft stuffing is introduced, bit by bit, till the proper contour of the skin is secured. I have seen very pretty work of this kind, particularly on small birds; but I consider it much more difficult to secure satisfactory results in this way than by hard stuffing, and I shall therefore confine attention to the latter. This method is applicable to all birds, is readily practised, facilitates setting of the wings, arranging of the plumage, and giving of any desired attitude. In hard stuffing, you make a firm ball of tow rolled upon a wire of the size and shape of the bird's body and neck together; you introduce this whole, afterwards running in the leg wires and clinching them immovably in the mass of tow.

Having your empty skin in good shape, as already described, cut three pieces of wire of the right\* size; one piece somewhat longer than the whole bird, the other pieces two or three times as long as the whole leg of the bird. File one end of each piece to a fine sharp point, try to secure a three-edged cutting point like that of surgical needles, rather than the smooth, punching point of a sewing needle, the former perforates more readily. Have these wires perfectly straight.† Bend a small portion of the unfiled end of the longer wire irregularly upon itself, as a convenient nucleus for the ball of tow.‡ Take fine clean tow, in loose dossils, and wrap it round and round the wire nucleus, till you make a firm ball, of the size and shape of the bird's body and neck. Study the contour of the skinned body: notice the swelling breast muscles, the arch of the lower back, the hollow between the furcula into

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\*The right size is the smallest that will support the whole weight of the stuffing and skin without bending, when a piece is introduced into each leg. If using too thick wire you may have trouble in thrusting it through the legs, or may burst the tarsal envelope.

†If accidentally kinky, the finer sizes of wire may be readily straightened by drawing strongly upon them so as to stretch them a little. Heavier wire must be hammered out straight.

‡Cotton will not do at all; it is too soft and elastic, and moreover will not allow of the leg wires being thrust into it and there clinched.

which the neck, when naturally curved, sinks. Everything depends upon correct shaping of the artificial body; if it be misshapen, no art can properly adjust the skin over it. Firmness of the tow ball and accurate contour may both be secured by wrapping the mass with sewing thread, loosening here, tightening there, till the shape is satisfactory. Be particular to secure a *smooth* superficies; the skin in drying will shrink close to the stuffing, disclosing its irregularities, if there be any, by the maladjustment of the plumage that will ensue. Observe especially that the neck, though the direct continuation of the backbone, dips at its lower end into the hollow of the merrythought, and so virtually begins there instead of directly between the shoulders. The three mistakes most likely to be made by a beginner are, getting the body altogether too large, not firm enough, and irregular. When properly made it will closely resemble the bird's body and neck, with an inch or several inches of sharp-pointed wire protruding from the anterior extremity of the neck of tow. You have now to introduce the whole affair into the skin. With the birdskin on its back, the tail pointing to your right elbow, and the abdominal opening as wide as possible, hold the body in position relative to the skin; enter the wire, pass it up through the neck, bring the sharp point exactly against the middle of the skull, pierce skull and skin, causing the wire to protrude some distance from the middle of the crown. Then by gentle means insinuate the body, partly pushing it in, partly drawing the skin over it, till it rests in its proper position. This is just like drawing on a tight kid glove, and no more difficult. See that the body is *completely* encased; you must be able to close the abdominal aperture entirely. You have next to wire the legs. Enter the sharp point of one of the leg wires already prepared, exactly at the centre of the sole of the foot, thrusting it up inside the tarsal envelope the whole length of the "shank," thence across the heel-joint\* and up along the next bone of the leg, still inside

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\* There is occasionally difficulty in getting the wire across this joint, from the point sticking into the enlarged end of the shin-bone. In such case, take stout

the skin. The point of the wire will then be seen within the skin and may be seized and drawn a little further through, and you will have passed a wire entirely out of sight all the way along the leg. The end of the wire is next to be fixed immovably in the tow ball. Thrust it in at the point where the knee, in life, rests against the side of the body.\* Bring the point to view, bend it over and reinsert it till it sticks fast. There are no special directions to be given here; fasten the wire in any way that effectually prevents "wabbling." You may find it convenient to wire both legs before fastening either, and then clinch them by twisting the two ends together. But remember that the leg wires may be fixed respecting each other, yet permit a see-saw motion of the body upon them. This must not be, the body and legs must be fixed upon a jointless frame. Having secured the legs, close the abdominal opening nicely, either by sewing or pinning, you may stick pins in anywhere, as freely as in a pin cushion; the feathers hide their heads. Stick a pin through the pope's nose, to fix the tail in place.

All this while the bird has been lying on its back, the neck stretched straight in continuation of the body, wired stiffly, the legs straddling wide apart, straight and stiff, the wings lying loosely, half-spread. Now bring the legs together, parallel with each other, and make the sharp bend at the heel joint that will bring the feet naturally under the belly (over it as the bird lies on its back). Pick up the bird by the wires that project from the soles and set it on its stand, by running the wires through holes bored the proper distance apart, and then securing the ends by twisting. The temporary stand that you use for this purpose should have a heavy or otherwise firm support, so as not easily to overturn during the subsequent manipulations. At this stage the bird is a sorry looking object; but

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pliers and pinch the joint till the bone is smashed to fragments. The wire will then pass and the comminution will not show. If there is any trouble in passing the wire through the tarsus, bore a hole for it with a Bradawl.

\* This point is further forward and more belly-ward than you might suppose. Observe the skinned body again, and see where the lower end of the thigh lies. If you insert the wire too far back, you cannot by any possibility balance the bird naturally on its perch; it will look in imminent danger of toppling over.



if you have stuffed correctly and wired securely, it will soon improve. Begin by making it *stand* properly. The common fault here is placing the tarsi too nearly perpendicular. Perching birds, constituting the majority, habitually stand with the tarsi more nearly *horizontal* than perpendicular, and generally keep the tarsi parallel with each other. Wading and most walking birds stand with the legs more nearly upright and straight. Many swimming birds straddle a little; others rarely if ever. See that the toes clasp the perch naturally, or are properly spread on the flat surface. Cause the flank feathers to be correctly adjusted over the tibiæ (and here I will remark that with most birds little, if any, of the tibiæ shows in life) the heel joint barely, if at all, projecting from the general plumage. It is a common fault of stuffing not to draw the legs closely enough to the body. Above all, look out for the centre of gravity; though you have really fastened the bird to its perch, you must not let it look as if it would fall off if the wires slipped; it must appear to rest there of its own accord. Next, give the head and neck a preliminary setting, according to the attitude you have determined upon. This will bring the plumage about the shoulders in proper position for the setting of the wings, to which you may at once attend. If the body be correctly fashioned and the skin of the shoulders only adjusted over it, the wings will fold into place without the slightest difficulty. All that I have said before about setting the wings in a skin applies here as well; but in this case they will not *stay* in place since they fall by their own weight. They must be pinned up. Holding the wing in place thrust a pin steadily through, near the wrist joint, into the tow body. Sometimes another pin is required to support the weight of the primaries; it may be stuck into the flank of the bird, the outer quill feather resting directly upon it. With large birds a sharp pointed wire must replace the pin. When properly set the wing tips will fall together or symmetrically opposite each other, the quills and coverts will be smoothly imbricated, the scapular series of feathers will lie close, and no bare space will show in front of the shoulder. Much depends upon the

*final* adjustment of the head. The commonest mistake is getting it too far away from the body. In the ordinary attitudes of most birds, little neck shows, the head appearing nestled upon the shoulders. If the neck appears too long, it is not to be contracted by pushing the head directly down upon it, but by making an S curve of the neck. No precise directions can be given for the set of the head but you may be assured it is a delicate, difficult matter; the slightest turn of the bill one way or another may alter the whole expression of the bird. You will of course have determined beforehand upon your attitude—upon what you wish the bird to appear to be doing; then, let your meaning be pointed by the bird's bill.

On the general subject of striking an attitude, and giving expression to a stuffed bird, little can be said to good purpose. If you are to become proficient in this art, it will come from your own study of birds in the field, your own good taste and appreciation of bird life. The manual processes are easily described and practised—it is easy to grind paint, I suppose, but not so to be an artist. I shall therefore only follow the above account of the general processes with some special practical points. After "attitudinizing" to your satisfaction, or to the best of your ability, the plumage is to be carefully "dressed." Feathers awry may be set in place with a light spring forceps, or needles fixed in a handle—one by one if necessary. When no individual feather seems out of place, it often occurs that the general plumage has a loose, slovenly aspect. This is readily corrected by wrapping with fine thread. Stick a pin into the middle of the back, another into the breast, and perhaps others elsewhere. Fasten the end of a spool of sewing cotton to one of the pins, and carry it to another, winding the thread about among the pins, till the whole surface is covered with an irregular network. Tighten to reduce an undue prominence, loosen over a depression; but let the wrapping as a whole be light, firm and even. This procedure, nicely executed, will give a smoothness to the plumage not otherwise attainable, and may be made to produce the most exquisite

curves particularly about the head, neck and breast. The thread should be left on till the bird is perfectly dry; it may then be unwound or cut off, and the pins withdrawn. When a particular patch of skin is out of place, it may often be pulled into position and pinned there. You need not be afraid of sticking pins in anywhere; they may be buried in the plumage and left there, or withdrawn when the skin is dry. In addition to the main stuffing, a little is often required in particular places. As for the legs, they should be filled out in all such cases as I indicated earlier in this chapter; small birds require no such stuffing. It is necessary to fill out the eyes so that the lids rest naturally; it may be done as heretofore directed, or by putting in pledgets of cotton from the outside. A little nice stuffing is generally required about the upper throat. To stuff a bird with spread wings requires a special process, in most cases. The wings are to be wired, exactly as directed for the legs; they may then be placed in any shape. But with most small birds, and those with short wings, simple pinning in the half spread position indicating fluttering will suffice; it is readily accomplished with a long, slender insect pin. I have already spoken of fixing the tail by pinning or wiring the pope's nose to the tow body; it may be thus fixed at any desired elevation or depression. There are two ways of spreading the tail. One is to run a pointed wire through the quills, near their base, where the wire will be hidden by the coverts; each feather may be set at any required distance from the next by sliding it along this wire. This method is applicable to large birds; for small ones the tail may be fixed with the desired spread by enclosing it near its base, in a split match, or two slips of card-board, with the ends tied together. This holds the feathers until they dry in position, when it is to be taken off. Crests may be raised, spread and displayed on similar principles. A small crest, like that of a cardinal or cherry bird, for instance, may be held up till it dries in position by sticking in behind it a pin with a little ball of cotton on its head. It is sometimes necessary to make a bird's toes grasp a support by tying them down to it till they

dry. The toes of waders that do not lie evenly on the surface of the stand may be tacked down with small brads. The bill may be pinned open or shut, as desired, by the method already given. Never paint or varnish a bird's bill or feet.

Substitution of an artificial eye for the natural one is essential for the good looks of a specimen. Glass eyes, of all sizes and colors, may be purchased at a moderate cost. The pupil is always black; the iris varies. You will, of course, secure the proper color if it is known, but if not, put in a dark brown or black eye. It is well understood that this means nothing—it is purely conventional. Yellow is probably the next most common color; then come red, white, blue and green, perhaps approximately in this order of frequency. But do not use these striking colors at hap-hazard, sacrificing truth perhaps, to looks. Eyes are generally inserted after the specimen is dry. Remove a portion of the cotton from the orbit, and moisten the lids till they are perfectly pliable; fix the eye in with putty or wet plaster of Paris, making sure that the lids are naturally adjusted over it. It goes in obliquely, like a button through a button-hole. Much art may be displayed in this little matter, making a bird look this way or that, to carry out the general "expression."

On finishing a specimen, set it away to dry—the time required varies, of course, with the weather, the size of the bird, its fatness, etc. The more slowly it dries, the better; there is less risk of the skin shrinking irregularly. You will often find that a specimen set away with smooth plumage and satisfactory curves dries more or less out of shape, perhaps with the feathers raised in places. I know of no remedy; it may, in a measure, be prevented by scrupulous care in making the body smooth and firm, and in securing slow, equable drying. When perfectly dry remove the wrapping, pull out the superfluous pins or wires, nip off the others so short that the ends are concealed, and insert the eyes. The specimen is then ready to be transferred to its permanent stand.

Fixtures for the display of the object of course vary interminably. We will take the simplest case, of a large collection

of mounted birds for public exhibition. In this instance, uniformity and simplicity are desiderata. "Spread eagle" styles of mounting, artificial rocks and flowers, etc., are entirely out of place in a collection of any scientific pretensions, or designed for popular instruction. Besides, they take up too much room. Artistic grouping of an extensive collection is usually out of the question; and when this is unattainable, half-way efforts in that direction should be abandoned in favor of severe simplicity. Birds look best on the whole in uniform rows, assorted according to size, as far as a natural classification allows. They are best set on the plainest stands, with circular base and a short cylindrical crossbar lightly turned upright. The stands should be painted dead-white and be no larger than is necessary for secure support; a neat stiff paper label may be attached.\* A small collection of birds, as an ornament to a private residence, offers a different case; here, variety of attitude and appropriate imitation of the birds' natural surroundings, are to be secured. A miniature tree, on which a number of birds may be placed, is readily made. Take stout wire, and by bending it, and attaching other pieces, get the framework of the tree of the desired size, shape and number of perches. Wrap it closely with tow to a proper calibre, remembering that the two forks of a stem must be together only about as large as the stem itself. Gather a basket full of lichens and tree moss; reduce them to coarse powder by rubbing with the hands; besmear the whole tree with mucilage or thin glue, and sift the lichen powder on it till the tow is completely hidden. This produces a very natural effect, which may be heightened by separately affixing larger scraps of lichen, or little bunches of moss; artificial leaves and flowers may be added at your taste. The groundwork may be similarly prepared with a bit of board, made adhesive and bestrewn with the same substance;

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\* A very simple and neat way of attaching the label to the stand is that used in the Peabody Academy of Science and other museums. It consists of narrow strips of tin bent over at each end so as to hold the label, and fixed to the stand by a small tack at any desired angle. These tins and neat red-lined labels can be had at the Naturalists' Agency, or the printed names can be cut from the "Check List" and used for labels for North American birds.

grasses and moss may be added. If a flat surface is not desired soak stout pasteboard, till it can be moulded in various irregular elevations and depressions; lay it over the board and decorate it in the same way. Rocks may be thus nicely imitated, with the addition of powdered glass of various colors. Such a lot of birds is generally enclosed in a cylindrical glass case with arched top. As it stands on a table to be viewed from different points, it must be presentable on all sides. A niche in parlor or study is often fitted with a wall-case, which, when artistically arranged, has a very pleasing effect. As such cases may be of considerable size, there is opportunity for the display of great taste in grouping. A place is not to be found for a bird, but a bird for the place—waders and swimmers below on the ground, perchers on projecting rests above. The surroundings may be prepared by the methods just indicated. One point deserves attention here—since the birds are only viewed from the front, they may have a “show-side” to which everything else may be sacrificed. Birds are represented flying in such cases more readily than under other circumstances—supported on a concealed wire inserted in the back of the case. I have seen some very successful attempts to represent a bird swimming, the duck being let down part way through an oval hole in a plate of thick glass, underneath which were fixed stuffed fishes, shells and seaweed. It is hardly necessary to add that in all ornamental collections, labels or other scientific machinery must be rigorously suppressed.

Transportation of mounted birds offers obvious difficulty. Unless very small, they are best secured immovably inside a box by screwing the foot of the stands to the bottom and sides, so that they stay in place without touching each other. Or, they may be carefully packed in cotton, with or without removal of the stands. Their preservation from accidental injury depends upon the same care that is bestowed upon ordinary fragile ornaments of the parlor. The ravages of insects are to be prevented upon the principles to be hereafter given in treating of the preservation of birdskins.

## CHAPTER VII.

### MISCELLANEOUS PARTICULARS.

§46. DETERMINATION OF SEX. This is an important matter, which must never be neglected. For although many birds show unequivocal sexual distinctions of size, shape and color, like those of the barnyard cock and hen for instance, yet the outward characteristics are more frequently obscure, if not altogether inappreciable on examination of the skin alone. Young birds, moreover, are usually indistinguishable as to sex, although the adults of the same species may be easily recognized. The rule results, that the sexual organs should be examined, as the only infallible indices. The essential organs of masculinity are the *testicles*; similarly, the *ovaries* contain the essence of the female nature. However similar the accessory sexual structures may be, the testicles and ovaries are always distinct. The male organs of birds never leave the cavity of the belly to fill an external bag of skin (*scrotum*) as they do among mammalia, they remain within the abdomen, and lie in the same position as the ovaries of the female. Both these organs are situated in the belly opposite what corresponds to the "small of the back," bound closely to the spine, resting on the front of the kidneys near their fore end. The testicles are a pair of subspherical or rather ellipsoidal bodies, usually of the same size, shape and color; and are commonly of a dull opaque whitish tint. They always lie close together. A remarkable fact connected with them is, that they are not always of the same size in the same bird, being subject to periodical enlargement during the breeding season, and corresponding atrophy at other seasons. Thus the testicles of a house sparrow, no bigger than a pin's head in winter, swell to the size of peas in April. The ovary (for although this organ is paired originally, only one is usually functionally developed in birds) will be recognized as a flattish mass of irregular contour, and usually whitish color; when inactive, it simply appears of finely granular structure which may require a hand lens to be made

out; when producing eggs, its appearance is unmistakable. Both testis and ovary may further be recognized by a thread leading to the end of the lower bowels—in one case the sperm-duct, in the other the oviduct; the latter is usually much the more conspicuous, as it at times transmits the perfect egg. There is no difficulty in reaching the site of these organs. Lay the bird on the right side, its belly toward you: cut with the scissors through the belly-walls diagonally from anus to the root of the last rib—or further, snipping across a few of the lower ribs, if these continue far down, as they do in a loon for instance. Press the whole mass of intestines aside collectively, and you at once see to the small of the back. There you observe the kidneys—large, lobular, dark reddish masses moulded into the concavity of the sacrum (or back middle bone of the pelvis) and on their surface, towards their fore end, lie testes or ovary, as just described. The only precaution required is, not to mistake for testicles a pair of small bodies capping the kidneys. These are the *adrenals* or “supra-renal capsules”—organs whose function is unknown, but with which at any rate we have nothing to do in this connection. They occur in both sexes, and if the testicles are not immediately seen, or the ovary not at once recognized, they might easily be mistaken for testicles. Observe that instead of lying in front, they *cap* the kidneys; that they are usually yellowish instead of opaque whitish; and that they have not the firm, smooth, regular sphericity of the testicles. The sex determined, use the sign ♂ or ♀ to designate it, as already explained. In the very rare cases of impotence or sterility among birds, of course no organs will be observed; but I should dislike to become responsible for such labelling without very careful examination. The organs of a small bird out of the breeding season are never conspicuous, but may always be found on close scrutiny, unless the parts are disintegrated by a shot.

§47. RECOGNITION OF AGE is a matter of ornithological experience requiring in many or most cases great familiarity with birds for its even approximate accomplishment. There are,



however, some unmistakable signs of immaturity, even after a bird has become full-feathered, that persist for at least one season. These are, in the first place, a peculiar soft fluffy "feel" of the plumage—the feathers lack a certain smoothness, density and stiffening which they subsequently acquire. Secondly, the bill and feet are softer than those of the adults; the corners of the mouth are puffy and flabby, the edges and point of the bill are dull, and the scales, etc., of the legs are not sharply cut. Thirdly, the flesh itself is tender, and pale colored. These are some of the points common to all birds, and are independent of the special markings that belong to the youth of particular species. Some birds are actually larger for a while after leaving the nest, than in after years when the frame seems to shrink somewhat in acquiring the compactness of senility. On the other hand, the various members, especially the bill and feet, are proportionally smaller at first. Newly growing quills are usually recognized on sight, the barrel being dark colored and full of liquid, while the vanes are incomplete. In studying, for example, the shape of a wing or tail, there is always reason to suspect that the natural proportions are not yet presented, unless the quill is dry, colorless and empty, or only occupied with shrunken white pith.

§48. EXAMINATION OF THE STOMACH frequently leads to interesting observations, and is always worth while. In the first place, we learn most unquestionably the nature of the bird's food, which is a highly important item in its natural history. Secondly, we often secure valuable specimens in other departments of zoology, particularly entomology. Birds consume incalculable numbers of insects, the harder kinds of which, such as beetles, are not seldom found intact in their stomachs; and a due percentage of these represent rare and curious species. The gizzards of birds of prey, in particular, should always be inspected, in search of the small mammals, etc., they devour; and even if the creatures are unfit for preservation, we at least learn of their occurrence, perhaps unknown before in a particular region. Mollusk-feeding and fish-eating

birds yield their share of specimens. The alimentary canal is often the seat of parasites of various kinds, interesting to the helminthologist; other species are to be found under the skin, in the body of muscle, in the brain, etc. Most birds are also infested with external parasites of many kinds, so various, that almost every leading species has its own sort of louse, tick, etc. Since these creatures are only at home with a *live* host, they will be found crawling on the surface of the plumage, preparing for departure, as soon as the body cools after death. There is in effect much to learn of a bird aside from what the prepared specimen teaches, and moreover apart from regular anatomical investigations. Whenever practicable, brief items should be recorded on the label, as already mentioned.

§49. RESTORATION OF POOR SKINS. If your cabinet be a "general" one, comprising specimens from various sources, you will frequently happen to receive skins so badly prepared as to be unpleasant objects, besides failing to show their specific characters. There is of course no supplying of missing parts or plumage; but if the defect be simply deformity, this may usually be in a measure remedied. The point is simply to *relax* the skin, and then proceed as if it were freshly removed from the bird; it is what bird stuffers constantly do, in mounting birds from prepared skins. The relaxation is effected by moisture alone. Remove the stuffing; fill the interior with cotton or tow saturated with water, yet not dripping: put pads of the same under the wings; wrap the bill and feet, and set the specimen in a damp cool place. Small birds soften very readily and completely; the process may be facilitated by persistent manipulation. This is the usual method, but there is another, more thorough and more effective; it is exposure to a vapor-bath. The appointments of the kitchen stove furnish all the apparatus required for an extempore "steamer;" the regular fixture is a tin vessel much like a wash-boiler, with closed lid, false bottom and stopcock at lower edge. On the false bottom is placed a heavy layer of gypsum, completely saturated with water; the birds are laid on a perforated tray above

it; and a gentle heat is maintained over a stove. The vapor penetrates every part of the skin, and completely relaxes it, without actually wetting the feathers. The time required varies greatly of course; observation is the best guide. The chief precaution is not to let the thing get too hot. Professor Baird has remarked that crumpled or bent feathers may have much of their original elasticity restored by dipping in hot water. Immersion for a few seconds suffices, when the feathers will be observed to straighten out. Shaking off superfluous water; they may be simply left to dry or they may be dried with plaster. The method is chiefly applicable to the large feathers of the wings and tail. Soiled plumage of dried skins may be treated exactly as in the case of fresh skins.

§50. MUMMIFICATION. As before mentioned, decay may be arrested by injections of carbolic acid and other antiseptics; if the tissues be sufficiently permeated with these substances, the body will keep indefinitely; it dries and hardens, becoming, in short, a "mummy." Injection should be done by the mouth and vent, be thorough, and be repeated several times as the fluid dries in. It is an improvement on this to disembowel, and fill the belly with saturated tow or cotton. Due care should be taken not to soil the feathers in any case, nor should the carbolic solution come in contact with the hands, for it is a powerful irritant poison. I mention the process chiefly to condemn it as an atrocious one; I cannot imagine what circumstances would recommend it, while only an extreme emergency could justify it. It is further objectionable because it appears to lend a dingy hue to some plumages, and to dull most of them perceptibly. Birds prepared—rather unprepared—in this way, may be relaxed by the method just described, and then skinned; but the operation is rather difficult.

§51. WET PREPARATIONS. By this term is technically understood an object immersed in some preservative fluid. It is highly desirable to obtain more information of birds than their stuffed skins can ever furnish, and their structure cannot be

always examined by dissection on the spot. In fact, a certain small proportion of the birds of any protracted or otherwise "heavy" collecting may be preferably and very profitably preserved in this way. Specimens in too poor plumage to be worth skinning may be thus utilized; so may the *bodies* of skinned birds, which, although necessarily defective, retain all the viscera, and also afford osteological material. Alcohol is the liquid usually employed and, of all the various articles recommended, seems to answer best on the whole. I have used a very weak solution of chloride of zinc with excellent results; it should not be strong enough to show the slightest turbidity. As glass bottles are liable to break when travelling, do not fit corners, and offer practical annoyance about corkage; rectangular metal cans, preferably of copper, with screw-lid opening, are advisable. They are to be set in small, strong wooden boxes, made to leave a little room for the lid wrench, muslin bags for doing up separate parcels, parchment for labels, etc. Unoccupied space in the cans should be filled with tow or a similar substance, to prevent the specimens from swashing about. Labelling should be on parchment: the writing should be perfectly dry before immersion: india-ink is the best. Skinned bodies should be numbered to correspond with the dried skin from which taken; otherwise they may not be identifiable. Large birds thrown in unskinned should have the belly opened, to let in the alcohol freely. Birds may be skinned, after being in alcohol, by simply drying them: they often make fair specimens. They are best withdrawn by the bill, that the "swash" of the alcohol at the moment of emersion may set the plumage all one way, and hung up to dry, untouched. Watery moisture that may remain after evaporation of the alcohol may be dried with plaster.

§52. OSTEOLOGICAL PREPARATIONS. While complete skeletonizing of a bird is a special art of some difficulty, and one that does not fall within the scope of this treatise, I may properly mention two bony preparations very readily made, and susceptible of rendering ornithology essential service. I refer

to the skull, and to the breast bone with its principal attachments. These parts of the skeleton are, as a rule, so highly characteristic that they afford in most cases invaluable zoological items. To save a skull is of course to sacrifice a skin, to all intents; but you often have mutilated or decayed specimens that are very profitably utilized in this way. The breast bone, excepting when mutilated, is always preservable with the skin, and for "choice" invoices may form its natural accompaniment. You want to remove along with it the *coracoids* (the stout bones connecting the breast bone with the shoulders), the merrythought intervening between these bones, and the shoulder-blades, all without detachment from each other. Slice off the large breast muscles close to the bone; and divide their insertions with the wing bones, scrape or cut away the muscles that tie the shoulder-blades to the chest; snip off the ribs close to the side of the breast bone; sever a tough membrane usually found between the prongs of the wish-bone; then, by taking hold of the *shoulders*, you can lift out the whole affair, dividing some slight connections underneath the bone and behind it. The following points require attention: the breast bone often has long slender processes behind and on the sides (the common fowl is one of the extreme illustrations of this) liable to be cut by mistake for ribs, or to be snapped: the shoulder-blades usually taper to a point, easily broken off; the merrythought is sometimes very delicate, or defective. When travelling, it is generally not advisable to make perfect preparations of either skull or sternum: they are best dried with only superfluous flesh removed, and besprinkled with arsenic. The skull, if perfectly cleaned, is particularly liable to lose the odd-shaped pronged bones that hinge the jaw, and the freely movable pair that push on the palate from behind. Great care should be exercised respecting the identification of these bones, particularly the sternum, which should invariably bear the number of the specimen to which it belongs. A skull is more likely to be able to speak for itself, and besides, is not usually accompanied by a skin; nevertheless, any record tending to facilitate its recognition should be

duly entered on the register. There are methods, with which I am not familiar, of making elegant bony preparations. You may secure very good results by simply boiling the bones or, what is perhaps better, macerating them in water till the flesh is completely rotted away, and then bleaching them in the sun. A little potassa or soda hastens the process. With breast bones, if you can stop the process just when the flesh is completely dissolved but the tougher ligaments remain, you secure a "natural" preparation, as it is called; if the ligaments go too, the associate parts of a large specimen may be wired together, those of a small one glued. I think it best, with skulls, to clean them entirely of ligament as well as muscle; for the underneath parts are usually those conveying the most desirable information, and they should not be in the slightest degree obscured. Since in such case the anvil-shaped bones, the palatal cylinders already mentioned, and sometimes other portions come apart, the whole are best kept in a suitable box. I prefer to see a skull with the sheath of the beak removed, though in some cases, particularly of hard billed birds, it may profitably be left on. The completed preparations should be fully labelled, by writing on the bone, in preference to an accompanying or attached paper slip, which *may* be lost. Some object to this, as others do to writing on eggs, that it "defaces" the specimen; but I confess I see in dry bones no beauty but that of utility.\*

§53. NESTS AND EGGS.† A few words upon this subject will not come amiss. Ornithology and oölogy are twin studies, or rather one includes the other. A collection of nests and eggs is indispensable in a thorough study of birds: and many persons find peculiar pleasure in forming one. Some, however, shrink from "robbing birds' nests" as something particularly cruel, a sentiment springing, no doubt, from the sympathy and def-

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\* Prof. Newton's excellent suggestions for saving parts of the skeleton are republished in one of the Smithsonian Reports, and may also be had separately.

† Complete instructions for collecting and preserving nests and eggs are published by the Smithsonian Institution and can be obtained from the Naturalists' Agency.

erence that the tender office of maternity inspires; but with all proper respect for the humane emotion, it may be said simply, that birds'-nesting is not nearly so cruel as bird-shooting. What I said in a former section, in endeavoring to guide search for birds, applies in substance to hunting for their nests; the essential difference is, that the latter are of course essential objects, and consequently more liable to be overlooked, other things being equal, than birds themselves. I have not myself proven a very successful finder of eggs, for no other reason than that a motionless object does not arrest my attention, when the swaying of a leaf, or the faintest chirp, would be instantly noted. Most birds nest on trees or bushes; many on the ground and on rocks; others in hollows. Some build elegant, elaborate structures, endlessly varied in details of form and material; others make no nest whatever. In this country, egging is chiefly practicable in May and during the summer; but some species, particularly birds of prey, begin to lay in January while, on our southern border at least, the season of reproduction is protracted through September; so there is really a long period for search. Particular nests, of course, like the birds that build them, can only be found through ornithological knowledge; but general search is usually rewarded with a varied assortment. The best clew to a hidden nest is the actions of the parents; patient watchfulness is commonly successful in tracing the birds home. As the science of oölogy has not progressed to the point of determining from the nests and eggs, to what bird they belong, in even a majority of cases, the utmost care in authentication is indispensable. To be worth anything, not to be worse than worthless in fact, an egg must be identified beyond question; must be not only unsuspected, but above suspicion.\* It is often extremely difficult to make an unquestionable determination, as for instance when numbers of birds of similar habits are breeding close together; or even impossible, as in case

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\*A shade of suspicion is often attached to dealers' eggs—not necessarily implying bad faith or even negligence on the dealers' part, but from the nature of the case.

the parent eludes observation. Sometimes the most acute observer may be mistaken, circumstances appearing to prove a parentage when such is not the fact. It is in general advisable to secure the parent with the eggs; if shot or snared on the nest, the identification is simply unquestionable. If you do not yourself know the species, it then becomes *necessary* to secure the specimen, and retain it with the eggs.

It is not required to make a perfect preparation; the head, or better, the head and a wing, will answer the purpose. When egging in downright earnest, a pair of climbing irons becomes practically indispensable; these are the only field implements required in addition to those already specified. For blowing eggs, a set of special tools is needed. These are "egg-drills"—steel implements with a sharp pointed conical head of rasping surface, and a slender shaft; several such, of different sizes, are needed; also blow-pipes of different sizes; a delicate thin pair of scissors; light spring forceps; and a small syringe.\* Eggs should never be blown in the old way of making a hole at each end; nor are two holes anywhere usually required. Opening should be effected on one side, preferably that showing least conspicuous or characteristic markings. If two are made, they should be rather near together; on the same side at any rate. But one is generally sufficient, as the fluid contents can escape around the blow-pipe. Holding the egg gently but steadily in the fingers, apply the point of the drill perpendicularly to the surface, unless it be preferred to prick with a needle first. A twirling motion of the instrument gradually enlarges the opening by filing away the shell, and so bores a smooth edged circular hole. This should be no larger than is required to insert the blow-pipe loosely, with room for the contents to escape around it. The blowing should be continuous and equable, rather than forcible; a strong puff easily bursts a delicate egg. Be sure that all the contents are removed; then rinse the interior thoroughly with clean water, either by taking a mouthful and sending it

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\*We notice an advertisement in the *AMERICAN NATURALIST* to the effect that these various instruments can be had at the Naturalists' Agency, Salem, Mass.



through the blow-pipe, or with the syringe. Blowing eggs is a rather fatiguing process — more so than it might seem; the cheek muscles soon tire, and the operator actually becomes “blown” himself before long. The operation had better be done over a basin of water, both to receive the contents, and to catch the egg if it slip from the fingers. The membrane lining the shell should be removed if possible. It may be seized by the edge around the hole, with the forceps, and drawn out, or picked out with a bent pin. Eggs that have been incubated of course offer difficulty, in proportion to the size of the embryo. The hole may be drilled, as before, but it must be larger; and as the drill is apt to split a shell after it has bored beyond a certain size of hole, it is often well to prick, with a fine needle, a circular series of minute holes almost touching, and then remove the enclosed circle of shell. This must be very carefully done, or the needle will indent or crack the shell, which, it may be remembered, grows more brittle towards the time of hatching. Well formed embryos cannot be got bodily through any *hole* that can be made in an egg: they must be extracted piecemeal. They may be cut to pieces with the slender scissors introduced through the hole, and the fragments be picked out with the forceps, hooked out, or blown out. No embryo should be forced through a hole too small; there is every probability that the shell will burst at the critical moment. When emptied and rinsed, eggs should be gently wiped dry, and set hole downward on blotting paper to drain. Broken eggs may be neatly mended, sometimes with a film of collodion, or a bit of tissue paper and paste, or the edges may be simply stuck together with any adhesive substance. Even when fragmentary a rare egg is worth preserving. Eggs should ordinarily be left empty; indeed, the only case in which any filling is admissible is that of a defective specimen to which some slight solidity can be imparted with cotton. It is unnecessary even to close up the hole. It is best, on all accounts, to keep eggs in *sets*, a “set” being the natural clutch, or whatever less number were taken from a nest. The most scrupulous attention must be paid to accu-

rate, complete, and permanent labelling. So important is this, that the undeniable defacing of a specimen, by writing on it, is no offset to the advantages accruing from such fixity of record. It is practically impossible to attach a label as is done with a birdskin, and a loose label is always in danger of being lost or misplaced. Write on the shell, then, as many items as possible; if done neatly, on the side in which the hole was bored, at least one good "show side" remains. An egg should always bear the same number as the parent, in the collector's record. In a general collection, where a separate ornithological and oölogical register is kept, identification of egg with parent is nevertheless readily secured, by making one the numerator the other the denominator of a fraction, to be simply inverted in its respective application. Thus bird No. 456, and egg No. 123, are identified by making the former  $\frac{456}{123}$ , the latter  $\frac{123}{456}$ . All the eggs of a clutch should have the same number. If the shell be large enough, the name of the species should be written on it; if too small, it should be accompanied by a label and may have the name indicated by a number referring to a certain catalogue. According to the present "Check List" for example, "No. 1" would indicate *Turdus migratorius*. The date of collection is a highly desirable item; it may be abbreviated thus; 3 | 6 | 72 means June 3, 1872. It is well to have the egg authenticated by the collector's initials at least. Since "sets" of eggs may be broken up for distributions to other cabinets yet permanent indication of the size of the clutch be wanted, it is well to have some method. A good one is to write the number of the clutch on each egg composing it, giving each egg of the set, moreover, its individual number. Supposing for example the clutch No.  $\frac{123}{456}$  contained five eggs; one of them would be  $\frac{123}{456} | 5 | 1$ : the next  $\frac{123}{456} | 5 | 2$ , and so on. But it should be remembered that all such arbitrary memoranda must be systematic, and be accompanied by a key. Eggs may be kept in cabinets of shallow drawers in little pasteboard trays, each holding a set, and containing a paper label on which various items that cannot be traced on the shell are written in full. Such trays should all be of the

same depth—half an inch is a convenient depth for general purposes; and of assorted sizes, say from one inch by one and one-half inches up to three by six inches; it is convenient to have the dimensions regularly graduated by a constant factor of, say half an inch, so that the little boxes may be set side by side, either lengthwise or crosswise, without interference. Eggs may also be kept safely, advantageously, and with attractive effect, in the nests themselves, in which a fluff of cotton may be placed to steady them. When not too bulky, too loosely constructed, or of material unsuitable for preservation, nests should always be collected. Those that are very closely attached to twigs should not be torn off. Nests threatening to come to pieces, or too frail to be handled without injury, may be secured by sewing through and through with fine thread: indeed, this is an advisable precaution in most cases. Packing eggs for transportation requires much care, but the precautions to be taken are obvious. I will only remark that there is no safer way than to leave them in their own nests, each enwrapped in cotton, with which the whole cavity is to be lightly filled; the nests themselves being packed close enough to be perfectly steady. Single eggs may be safely mailed to any distance in auger-holes bored in wood.

## CHAPTER VIII.

### CARE OF A COLLECTION.

§54. WELL PRESERVED SPECIMENS will last "forever and a day," so far as natural decay is concerned. I have handled birds in good state, shot back in the twenties, and have no doubt that some eighteenth century preparations are still extant. The precautions against defilement, mutilation or other mechanical injury, are self-evident, and may be dismissed with the remark, that *white* plumages, especially if at all greasy, require the most care to guard against soiling. We have, however, to fight for our possessions against a host of enemies, individually despicable but collectively formidable, foes so determined that untiring vigilance is required to ward off their attacks even temporarily, whilst in the end they prove invincible. It may be said that to be eaten up by insects is the natural end of all birdskins not sooner destroyed. The matter, therefore, demands particular attention.

§55. INSECT PESTS with which we have to contend belong principally to the two families *Tineidæ* and *Dermestidæ*—the former are moths, the latter beetles. The moths are of species identical with, and allied to, the common clothes moth, *Tinea flavifrontella*, the carpet moth, *T. tapetzella*, etc.,—small species observed flying about our apartments and museums, in May and during the summer. The beetles are several rather small thick-set species, principally of the genera *Dermestes* and *Anthrenus*. The larvæ ("caterpillars" of the moths, and "grubs" of the beetles) appear to be the chief agents of the destruction. The presence of the mature insects is usually readily detected; on disturbing an infested suite of specimens the moths flutter about, and the beetles crawl as fast as they can into shelter, or simulate death. The insidious larvæ, however, are not so easily observed, burrowing as they do among the feathers, or in the

interior of a skin; whilst the minute eggs are commonly altogether overlooked. But the "bugs" are not long at work without leaving their unmistakable traces. Shreds of feathers float off when a specimen is handled, or fly out on flipping the skin with the fingers, and in bad cases even whole bundles of plumes come away at a touch. Sometimes, leaving the plumage intact, bugs eat away the horny covering of the bill and feet, making a peculiarly unhappy and irreparable mutilation. I suppose this piece of work is done by a particular insect, but if so I do not know what one. It would appear that when the bugs effect lodgment in any one skin, they usually finish it before attacking another, unless they are in great force. We may consequently, by prompt removal of an infested specimen, save further depredations; nevertheless the rest become "suspicious," and the whole drawer or box should at any rate be quarantined, if not submitted to any of the processes described beyond. Our lines of defence are several. We may mechanically oppose entrance of the enemy; we may meet him with abhorrent odors that drive him off, sicken or kill him, and finally we may cook him to death. I will notice these methods successively, taking occasion to describe a *cabinet* under head of the first.

§56. CASES FOR STORAGE OR TRANSPORTATION should be rather small, for several reasons. They are easier to handle and pack. There are fewer birds pressing each other. Particular specimens are more readily reached. Bugs must effect just so many more separate entrances to infest the whole. Small lids are more readily fitted tight. For the ordinary run of small birds I should not desire a box over  $18 \times 18 \times 18$ , and should prefer a smaller one; for large birds, a box just long enough for the biggest specimen, and of other proportions to correspond fairly, is most eligible. Whatever the dimensions, a proper box presupposes perfect jointing; but if any suspicion be entertained on this score, stout paper should be pasted along all the edges, both inside and out. We have practically to do with the lid only. If the lot is likely to remain long untouched,

the cover may be screwed very close and the crack pasted like the others. Under other and usual circumstances the lid may be provided with a metal boss fitting a groove lined with india rubber or filled with wax. An excellent case may be made of tin with the lids secured in this manner, and further fortified with a wooden casing. Birdskins entirely free from insects or their eggs, encased in some such secure manner, will remain intact indefinitely; but there is misery in store if any bugs or nits be put away with them. When many boxes are stored or forwarded, much time and inconvenience may be saved by labelling each with a summary of contents, or with a number referring to an inventory.

§57. CABINETS. As a matter of fact, most collections are kept readily accessible for examination, display or other immediate use, and this precludes any disposition of them in "hermetical" cases. The most we can do is to secure tight fitting of movable woodwork. The "cabinet" is most eligible for private collections. This is, in effect, simply a bureau, or chest of drawers, protected with folding doors, or a front that may be detached, either of plain wood or sashing for panes of glass. It is simply astonishing how many birdskins of average size can be accommodated in a cabinet that makes no inconvenient piece of furniture for an ordinary room. A cabinet may of course be of any desired size, shape and style. In general it will be better to put money into excellence of fitting rather than elegance of finish: the handsomest front does not compensate for a crack in the back or for a drawer that hitches. There should not be the slightest flaw in the exterior, and doors should fit so tightly that a puff of air may be felt on closing them. The greatest desideratum of the interior work, next after close fitting yet smooth running of the drawers, is economy of space. This is secured by making the drawers as thin as is consistent with stability; by having them slide by a boss at each end fitting a groove in the side wall, instead of resting on horizontal partitions; and by hinged countersunk handles instead of knobs. I do not recommend, except for a suite of

the smallest birds, a multiplicity of shallow drawers, accommodating each one layer of specimens; it is better to have fewer deeper drawers, into which light shallow movable trays are fitted. These trays never need be of stuff over one-eighth or one-fourth thick, and may have stiff pasteboard bottoms glued or tacked on. They may vary from one-half inch to two inches in depth, but this dimension should always be some factor of the depth of the drawer, so that a certain number of trays may exactly fill it. They should be just as long as one transverse dimension of the drawer, and rather narrow, so that two or more are set side by side. Finally, though they may be of different depths, they should be of the same length and breadth, so as to be interchangeable. They may simply rest on top of each other, or slide on separate projections inside the drawer. Such trays are extremely handy for holding particular sets of species, to be carried to the study table without disturbing the rest of the collection.

If a collection be so extensive that any particular specimen may not be readily hunted up it will be found convenient to have the drawers themselves labelled with the name of the group within. A collection should always be methodically arranged—preferably according to some approved or supposed natural classification of birds; this is also the readiest mode, since, with some conspicuous exceptions birds of the same natural group are approximately of the same *size*. If I were desired to suggest proportions for a private cabinet of most general eligibility, I should say four feet high, by three feet wide, by two feet deep, in the clear; this makes a portly yet not unwieldy looking object. It is wide enough for folding doors, to be secured by bolts at top and bottom, and lock; not so high that the top drawer is not readily inspected; and of proportionate depth. Such a case will take seven drawers six inches deep either of the full width, or in two series with a median partition; these drawers will hold anything up to an eagle or crane. A part of them at least should have a full complement of such trays as I have described—say three or four tiers of the shallower trays, three trays to a tier, each

about two feet long by about a foot wide; and one or two tiers of deeper trays. There are about forty thousand cubic inches in such a cabinet, of which perhaps one-tenth is occupied with woodwork; and I should judge that some eight or ten thousand hummingbirds, for instance (and other birds in proportion), could be accommodated in layers, a single bird deep. Be this as it may, I have kept all the birds, excepting a few of the largest, that I ever cared to have at my elbow at any one time, in one cabinet of such dimensions.

§58. TO DESTROY BUGS. In our present case prevention is not the best remedy, simply because it is not always practicable; in spite of all mechanical precautions the bugs will get in. We have, therefore, to see what will destroy them, or at least stop their ravages. It is a general rule that any pungent aromatic odor is obnoxious to them, and that any very light powdery substance restrains their movements by getting into the joints and breathing pores. Both these qualities are secured in the ordinary "insect powder," to be had of any leading druggist. It should be lavishly strewn on and among the skins, and laid in the corners of the drawers and trays. Thus used it proves highly effective, and is on the whole the most eligible substance to use when a collection is being constantly handled. Camphor is a valuable agent. Small fragments may be strewn about the drawers, or a lump pinned in mosquito netting in a corner. Benzine is also very useful. A small saucer full may be kept evaporating, or the liquid may be sprinkled—even poured—directly over the skins; it is very volatile and leaves little or no stain. It is, however, obviously ineligible when a collection is in constant use. My friend Mr. Allen informs me he has used sulphide of carbon with great success. The objection to this agent is, that it is a stinking poison; should be used in the open air, to escape the ineffably disgusting and deleterious odors, and its employ is probably restricted to cases for storage. When the bill or feet show they are attacked, further depredation may be prevented by pencilling with a strong solution of corrosive sublimate; a



weaker solution, one that leaves no white film, on drying, on a black feather, may even be brushed over the whole plumage in certain cases. But remember that this is a deadly poison and must be used with care. Specimens may be buried in coarse refuse tobacco leaves. One or another of these lines of defence will commonly prove successful in destroying or driving off mature insects, and even in stopping the ravages of the larvæ; but I doubt that any such means will kill the "nits." With these we must deal otherwise; and their destruction no less than that of their parents is assured, if we subject them to a high temperature. Baking birdskins is really the only process that can make us feel perfectly safe. Infected specimens, along with suspected ones, should be subjected to a dry heat, from 212° F. up to any degree short of singeing the plumage. This is readily done by putting the birds in a wooden tray in any oven—they must however be watched, unless you have special contrivances for regulating the temperature. How long a time is required is probably not ascertained with precision; it will be well to bake for several hours. When the beetles and larvæ are found completely parched, it may be confidently believed that the unseen eggs are out of the hatching way forever. The specimens may be immediately replaced in the cabinet, after flipping or brushing off loosened feathers.

§59. TWO ITEMS. One is, that arsenic helps to keep out the bugs, besides preventing decay—a fact that should never be forgotten, and that should give sharper edge to my advice respecting lavish use of the substance at the outset. If it be true, as some state, that bugs can eat arsenic without dying, it is also true, that they do not relish it; and in entering a case of skins they will burrow by preference in those holding the least of it. This fact is continually exhibited in large collections, where, if two birds be side by side, one being duly arsenicized and the other not so, one will be taken and the other left. My second item, with its proper deduction, will form, I think, a fitting conclusion to this treatise. It is a fact in the natural history of these our pests, that they are fond of peace

and quiet—they do not like to be disturbed at their meals, nor even between times. So it results, that they rarely effect permanent lodgment in a collection that is being constantly handled—though the doors stand open for hours daily, they will seek elsewhere. As a consequence, the degree of our diligence in *studying* birdskins is likely to become the measure of our success in preserving them. I once read a work, by an eminent and learned divine, on the “Moral Uses of Dark Things,” under which head the author included everything from earthquakes to mosquitoes. If there be a moral use in the “dark thing” that museum pests certainly are to us, we have it here. The very bugs urge on our work.



# APPENDIX

TO THE

## MANUAL OF INSTRUCTION.

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### ADDITIONS AND CORRECTIONS.

As the author's absence on a collecting tour during the printing of this volume rendered revision of proof-sheets impracticable, some notes since received from him are appended. A few self-correcting typographical errors, notably in punctuation, are passed over.

The comparatively few technical terms used in the treatise for the parts and organs of birds are defined and explained in the "Key to North American Birds," obviating the necessity of a separate glossary. Familiarity with the "Topography" of birds will facilitate taxidermy; the subject is treated at length in the work just mentioned. (F. W. P.)

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Page 7. Further experience changes my former preference for metal instead of paper cartridges for breech-loaders. The latter may of course be loaded according to circumstances with the same facility, and even reloaded if desired. It is a good deal of trouble to take care of the metal shells, to prevent loss, keep them clean, and avoid bending or indenting; while there is often a practical difficulty in re-capping—at least with the common styles that take a special primer. Those fitted with a screw top holding a nipple for ordinary caps are expensive. Paper cartridges come already capped, so that this bother is avoided, as it is not ordinarily worth while to reload them. They are made of different colors, distinguishing various sizes of shot used

without employ of colored wads as suggested in the text. They may be taken into the field empty, and loaded on occasion to suit; but it is better to pay a trifle extra to have them loaded at the shop. In such case, about four-fifths of the stock should contain mustard-seed, nearly all the rest about No. 7, a very few being reserved for about No. 4. Cost of ammunition is hardly appreciably increased; its weight is put in the most conveniently portable shape; the whole apparatus for carrying it, and loading the shells, is dispensed with; much time is saved, the entire drudgery (excepting gun-cleaning) of collecting being avoided. I was prepared in this way during the past summer for the heaviest work I have yet succeeded in accomplishing during the same length of time. In June, when birds were plentiful, I easily averaged fifteen skins a day, and occasionally made twice as many. As items serving to base calculations, I may mention that in four months I used about two thousand cartridges, loaded, at \$42 per M., with seven-eighths of an ounce of shot and two and three-fourths drachms of powder; only about three hundred were charged with shot larger than mustard-seed. In estimating the size of a collection that may result from use of a given number of cartridges, it may not be safe for even a good shot to count on much more than half as many specimens as cartridges. The number is practically reduced by the following steps:—Cartridges lost or damaged, or originally defective; shots missed; birds killed or wounded, not recovered; specimens secured unfit for preservation, or not preserved for any reason; specimens accidentally spoilt in stuffing, or subsequently damaged so as to be not worth keeping; and finally, use of cartridges to supply the table. I will add, that my preference for central-fire cartridges continues.

Page 10, line 7 from bottom, *for* where *read* when.

“ 13; “*at half-cock.*” Some guns are now fitted with a “re-bounding” lock, as it is called; an arrangement by which the hammer flies back to half-cock as soon as it has delivered the blow. This device enhances safety, and is particularly eligible, for breech-loaders, since the gun may at once be broken down, reloaded and relocked, without fingering the hammer.

Page 28; *rarity of birds.* In striking illustration of the text may be cited the cases of Baird’s Bunting and the Missouri Skylark, both birds which remained for many years among our special desiderata, but which are two of the most abundant and characteristic species of Northern Dakota, where I lately took as many of each as I wanted. (See Am. Nat. vii, 1873. p. 695.)

Page 28. Treating of the suite of each species that it is desirable to secure, I neglected to speak particularly of the care that should be taken to procure full series of *females*. Most miscellaneous collections

contain four or more males to every female—a disproportion that should be as far reduced as possible. The occasion of the disparity is obvious—females are usually more shy and retiring in disposition, and consequently less frequently noticed, while their smaller size, as a rule, and plainer plumage, further favor their eluding observation. The difference in coloring is greatest among those groups where the males are most richly clad, and the shyness of the mother birds is most marked during the breeding season, just when the males, full of song and in their nuptial attire, become most conspicuous. It is often worth while to neglect the gay Benedicts, to trace out and secure the plainer but not less interesting females. This pursuit, moreover, often leads to discovery of the nests and eggs—an important consideration. Although both sexes are generally found together when breeding, and mixing indiscriminately at other seasons, they often go in separate flocks, and often migrate independently of each other—in this case the males usually in advance. Towards the end of the passage of some warblers, for instance, we may get almost nothing but females, all our specimens of a few days before having been males. The notable exceptions to the rule of smaller size of the female are among rapacious birds and many waders—though in these last the disparity is not so marked. I do not recall an instance, among American birds, of the female being more richly colored than the male. When the sexes are notably different in adult life, the *young* of both sexes resemble the adult female—the young males gradually assuming their distinctive characters. When the adults of both sexes are alike, the young commonly differ from them.

In the same connection I wish to urge a point, the importance of which is often overlooked; it is our practical interpretation of the adage, “a bird in the hand is worth two in the bush.” Always keep the first specimen you secure of a species till you get another; no matter how common the species, how poor the specimen, or how certain you may feel of getting other better ones, *keep it*. Your most reasonable calculations may come to naught, from a variety of circumstances, and *any* specimen is better than no specimen, on general principles. And in general do not, if you can help it, discard any specimen *in the field*. No tyro can tell what will prove valuable and what not; while even the expert may regret to find that a point comes up which a specimen he injudiciously discarded might have determined. Let a collection be “weeded out,” if at all, only after deliberate and mature examination, when the scientific results it affords have been elaborated by a competent ornithologist; and even then, the refuse (with certain limitations) had better be put where it will do *some* good, than be destroyed utterly. For instance, I myself once valued, and used, some Smithsonian “sweepings”; and I know very well what

to do with specimens, *now*, to which I would not give houseroom in my own cabinet. If forced to reduce bulk, owing to limited facilities for transportation in the field (as too often happens), throw away according to *size*, other things being equal. Given only so many cubic inches or feet, eliminate the few *large* birds, which take up the space that would contain fifty or a hundred different little ones. If you have a fine large bald eagle or pelican, for instance, throw it away first, and follow it with your ducks, geese, etc. In this way, the bulk of a large miscellaneous collection may be reduced one-half, perhaps, with very little depreciation of its actual value. The same principle may be extended to other collections in natural history (excepting fossils, which are always weighty, if not also bulky); very few bird-skins, indeed, being as valuable contributions to science as, for example, a vial of miscellaneous insects that occupies no more room may prove to be.

Page 34, line 7 from bottom, *for drawn read driven*.

“ 41, “ 3, *for drop read drip*.

“ 46, “ 15, *for toed read told*.

“ 49, obverse of diagram, *for Butes read Buteo*.

“ 52, line 12 from bottom, *for answers read answering*.

“ 50, “ 5 from bottom, *omit is before from*.

“ 54, “ 8, *for only read duly*.

“ 66, “ 17, *for instruments confine read instrument confines*.

“ 68, “ 6 of footnote, *for drawing read driving*.

“ 69, “ 10 from bottom, *omit for before one*.

“ 71, “ 4 from bottom, *for internally read intimately*.

“ 75. Mentioning the thin-skinned cardinal grosbeak, I overlooked the night-hawks and whippoorwills (*Caprimulgidæ*), in which the skin is still more tender and liable to be torn.

Page 87, line 15 from bottom, *for only read duly*.

“ 91, “ 12, *after crossbar insert on a*.

“ 94. Testes vary more in shape and color than may be inferred from the text, being sometimes rather linear or oblong, and grayish, livid bluish, or even reddish. I lately found, in a bay-winged bunting, only one testis, twice as large as natural to compensate for want of the other.

Page 94, line 3, *for bowels read bowel*.

“ 101, “ 7, first word, *for essential read stationary*.

“ 108, “ 5, *for lids read lid*.

CHECK LIST

OF

NORTH AMERICAN BIRDS.





## CHECK LIST OF NORTH AMERICAN BIRDS.

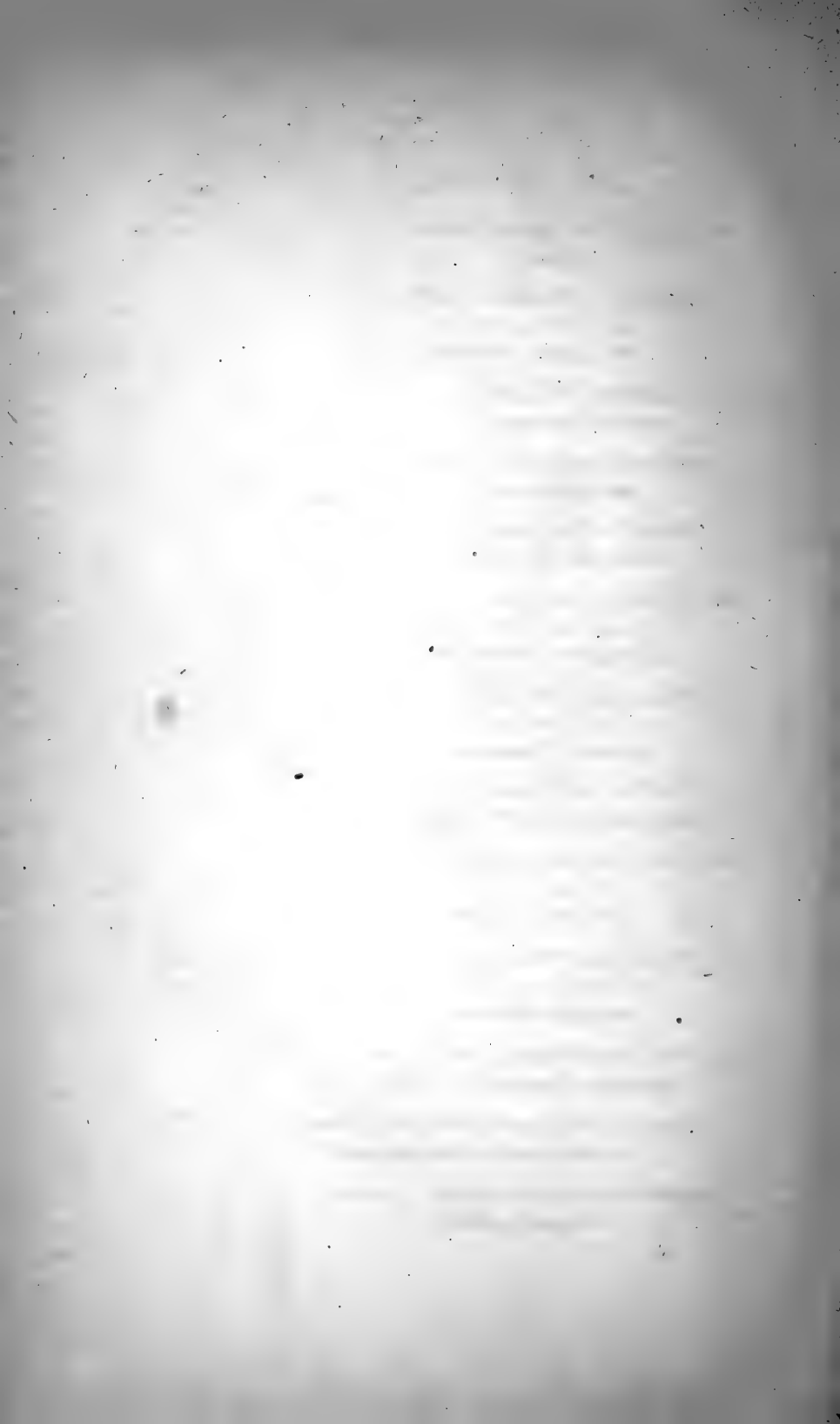
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NOTE.—The species are numbered consecutively from 1 to 635. Stragglers have the number in brackets. Varieties bear the number of the species to which they belong, with *a*, *b*, *c*, etc., unless a variety is our only representative of the species, when it is separately enumerated. Obscure or doubtful species are marked with a note of interrogation after the number. Each species is followed by the original describer's name; when this is not also the authority for the nomenclature adopted the name of such authority is added, the former being retained in parenthesis. A similar practice is observed in the cases of varieties; when, as in most instances, they were originally described as species they are followed by the authority for their reduction to varieties, as well as by the name of the describer; the latter in parenthesis.

The List contains a very few species discovered since the "Key" was printed; otherwise, it is an exact reflection of that work, the arrangement and nomenclature being identical. The numbers of the genera as used in the Key are given in the head lines of the List in order to facilitate reference.

Authors are at variance in the formation of the genitive of Latinized proper names; in the absence of any universally observed rule, euphony may perhaps be advantageously consulted. In the Key, the *i* was doubled in all cases of words ending in a consonant, the nominative being considered to end in *-ius*; this practice is preferably applicable to monosyllables, as *Bairdii*, and polysyllables, as *Audubonii*. But it is necessary to use single *i* in words ending in *r*, as *Cooperi*, and best to do so in most cases of dissyllables, as *Wilsoni*, *Cassini*, *Swainsoni*. The same is the case with all words ending in a vowel.

The following are the abbreviations used for authors' names occurring most frequently; others are for the most part written in full:—*All.*, Allen; *Aud.*, Audubon; *Bd.*, Baird; *Bodd.*, Boddaert; *Bp.*, Bonaparte; *Cab.*, Cabanis; *Cass.*, Cassin; *Cs.*, Coues; *Gamb.*, Gambel; *Gm.*, Gmelin; *Gr.*, Gray; *L.*, Linnæus; *Lafr.*, Lafresnaye; *Lath.*, Latham; *Lawr.*, Lawrence; *Licht.*, Lichtenstein; *Nutt.*, Nuttall; *Reich.*, Reichenbach; *Ridg.*, Ridgway; *Scl.*, Sclater; *Steph.*, Stephens; *Sw.*, Swainson; *Temm.*, Temminck; *Towns.*, Townsend; *V.*, Vieillot; *Fig.*, Vigers; *Wagl.*, Wagler; *Wils.*, Wilson.



1. **TURDUS MIGRATORIUS L.**  
**Robin.**
- 1a. **TURDUS MIGRATORIUS L.,**  
*var. CONFINIS* (Bd.) Cs.  
**St. Lucas Robin.**
2. **TURDUS NÆVIUS GM.**  
**Varied Thrush.**
3. **TURDUS MUSTELINUS GM.**  
**Wood Thrush.**
4. **TURDUS PALLASI CAB.**  
**Hermit Thrush.**
- 4a. **TURDUS PALLASI CAB.,**  
*var. AUDUBONII* (Bd.) Cs.  
**Audubon's Thrush.**
- 4b. **TURDUS PALLASI CAB.,**  
*var. NANUS* (Aud.) Cs.  
**Dwarf Thrush.**
5. **TURDUS SWAINSONI CAB.**  
**Olive-backed Thrush.**
- 5a. **TURDUS SWAINSONI CAB.,**  
*var. ALICLÆ* (Bd.) Cs.  
**Alice's Thrush.**
- 5b. **TURDUS SWAINSONI CAB.,**  
*var. USTULATUS* (Nutt.) Cs.  
**Oregon Thrush.**
6. **TURDUS FUSCESCENS STEPH.**  
**Wilson's Thrush. Veery.**
7. **OREOSOPTES MONTANUS (TOWNS.) BD.**  
**Mountain Mockingbird.**
8. **MIMUS POLYGLOTTUS (L.) BOIE.**  
**Mockingbird.**



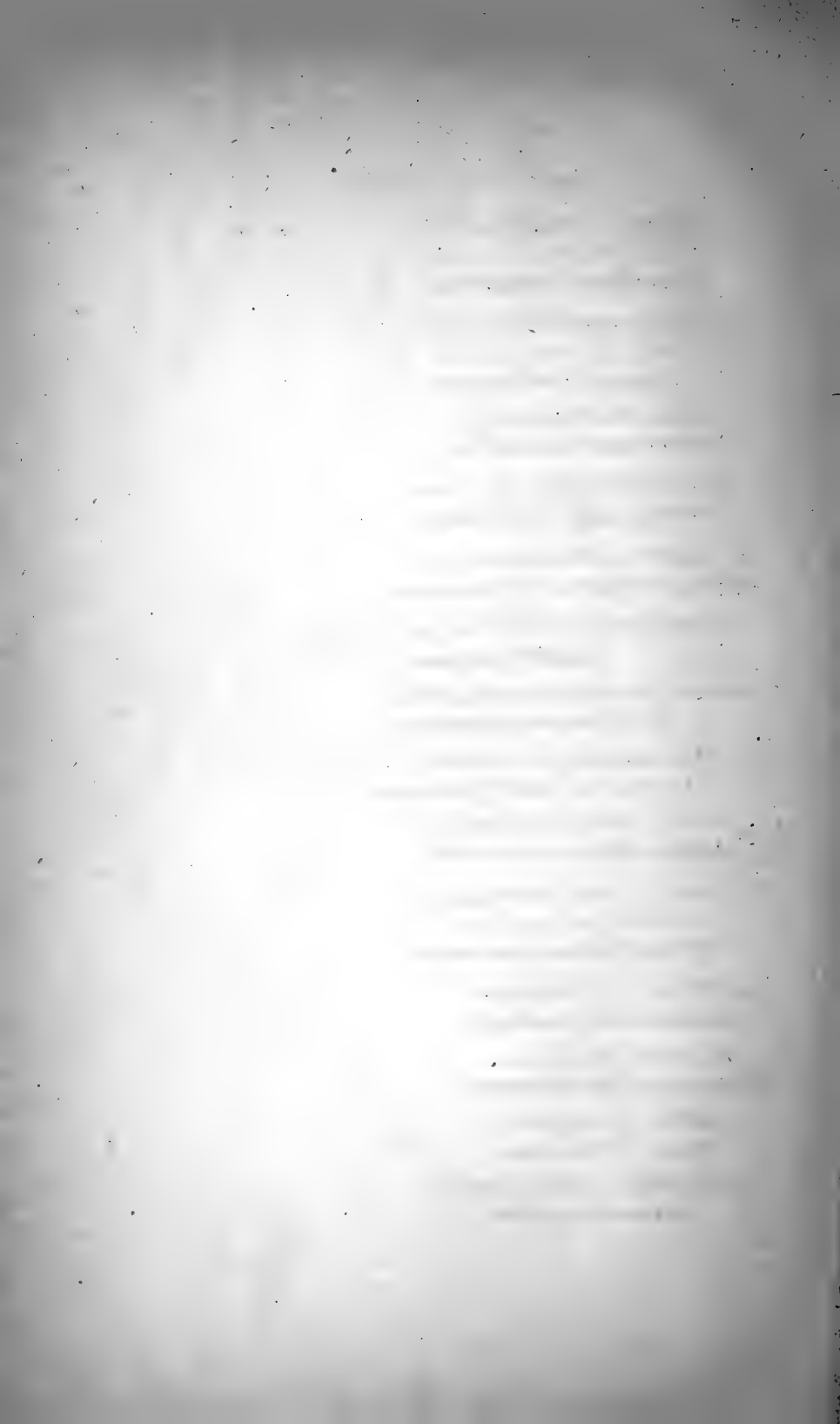
9. **MIMUS CAROLINENSIS** (L.) GR.  
**Catbird.**
10. **HARPORHYNCHUS RUFUS** (L.) CAB.  
**Brown Thrush. Thrasher.**
- 10a. **HARPORHYNCHUS RUFUS** (L.) CAB.,  
*var. LONGIROSTRIS* (LafR.) CS.  
**Long-billed Thrush.**
11. **HARPORHYNCHUS CURVIROSTRIS** (SW.) CAB.,  
*var. PALMERI* Ridg.  
**Curve-billed Thrush.**
- 11bis.\* **HARPORHYNCHUS BENDIREI** CS.  
**Bendire's Thrush.**
12. **HARPORHYNCHUS CINEREUS** BD.  
**Cinereous Thrush.**
13. **HARPORHYNCHUS REDIVIVUS** (GAMB.) CAB.  
**Sickle-billed Thrush.**
- 13a. **HARPORHYNCHUS REDIVIVUS** (GAMB.) CAB.,  
*var. LECONTEI* (LAWT.) CS.  
**LeConte's Thrush.**
14. **HARPORHYNCHUS CRISSALIS** HENRY.  
**Red-vented Thrush.**
- [15]. **SAXICOLA GENANTHE** (L.) BECHSTEIN.  
**Stone Chat. Wheat-ear.**
16. **SIALIA SIALIS** (L.) HALDEMAN.  
**Eastern Bluebird.**
17. **SIALIA MEXICANA** SW.  
**Western Bluebird.**
18. **SIALIA ARCTICA** SW.  
**Arctic Bluebird.**

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\*11bis. Not in the Key. See Am. Nat., Vol. vii, p. 330, 1873.

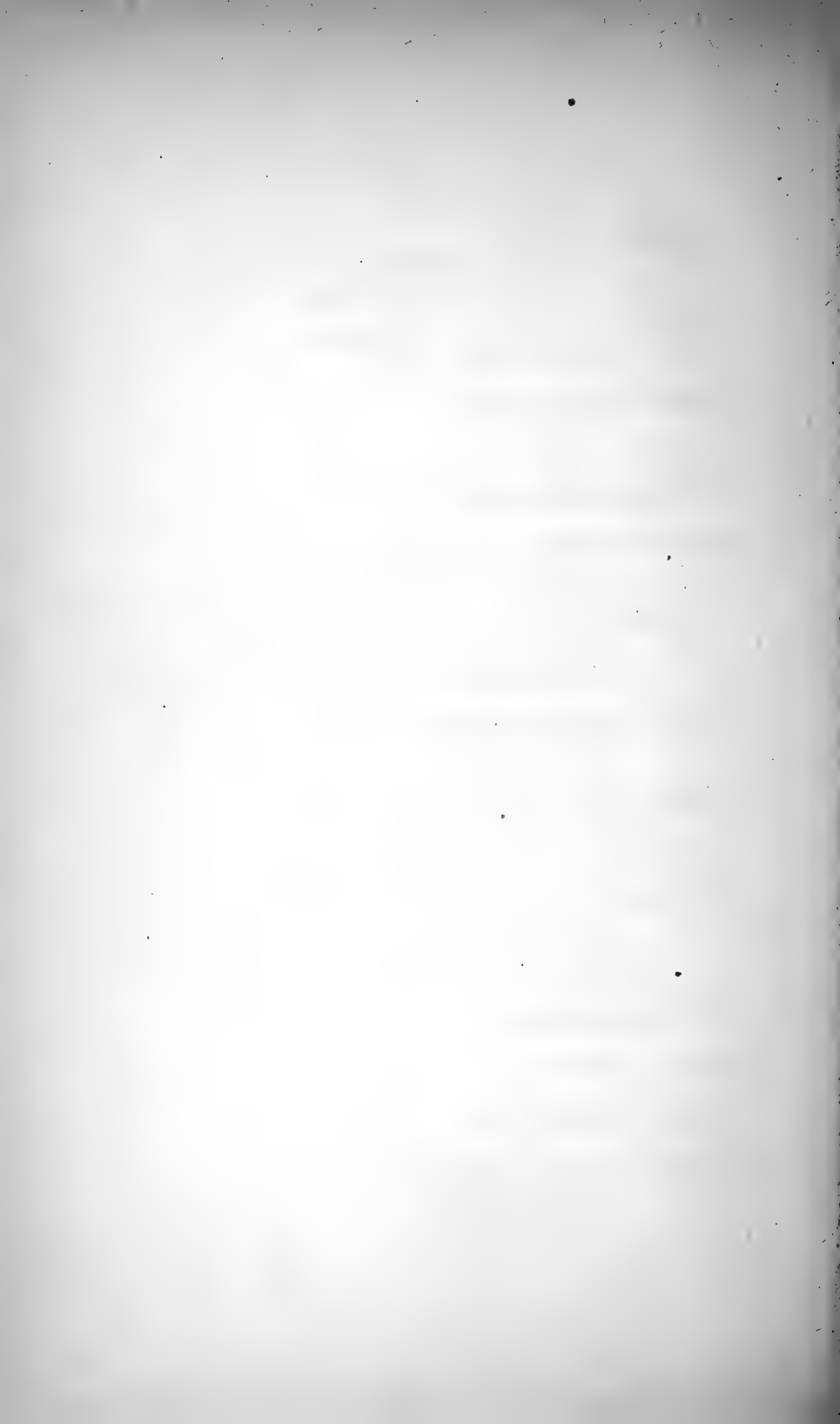


19. *CINCLUS MEXICANUS* SW.  
**Water Ouzel. Dipper.**
- [20]. *PHYLLOPNEUSTE BOREALIS* BLASIUS.  
**Kennicott's Sylvia.**
21. *REGULUS CALENDULA* (L.) LICHT.  
**Ruby-crowned Kinglet.**
22. *REGULUS SATRAPA* LICHT.  
**Golden-crested Kinglet.**
23. *POLIOPTILA CÆRULEA* (L.) SCL.  
**Blue-gray Gnatcatcher.**
24. *POLIOPTILA MELANURA* LAWR.  
**Black-headed Gnatcatcher.**
25. *POLIOPTILA PLUMBÆA* BD.  
**Plumbeous Gnatcatcher.**
26. *CHAMÆA FASCIATA* GAMB.  
**Fasciated Tit. Ground Wren.**
27. *LOPHOPHANES BICOLOR* (L.) BP.  
**Tufted Titmouse.**
28. *LOPHOPHANES INORNATUS* (GAMB.) CASS.  
**Plain Titmouse.**
29. *LOPHOPHANES ATRICRISTATUS* CASS.  
**Black-crested Titmouse.**
30. *LOPHOPHANES WOLLWEBERI* BP.  
**Bridled Titmouse.**
31. *PARUS ATRICAPILLUS* L.  
**Black-capped Chickadee.**
- 31a. *PARUS ATRICAPILLUS* L.,  
*var. SEPTENTRIONALIS* (Harris) AL.  
**Long-tailed Chickadee.**

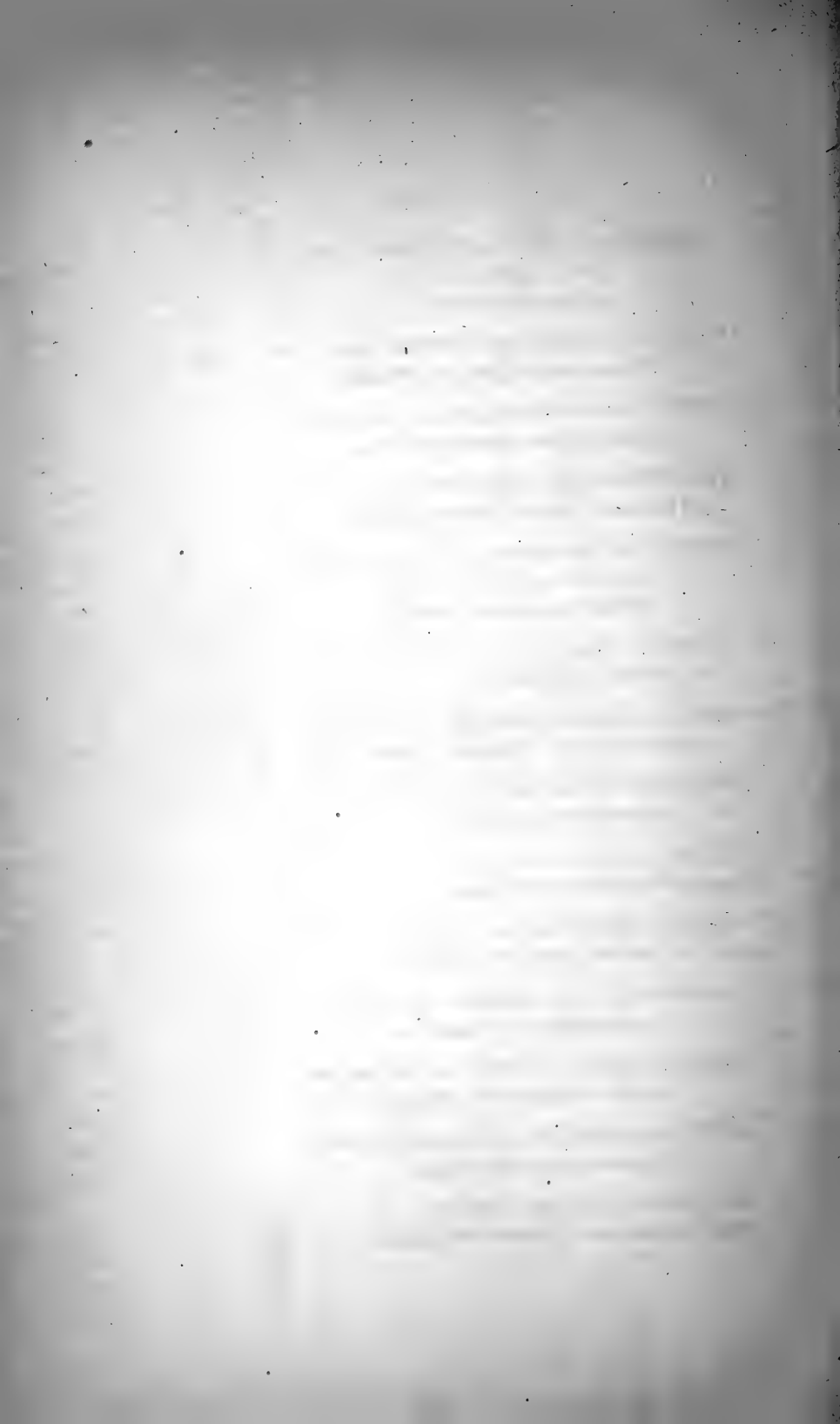




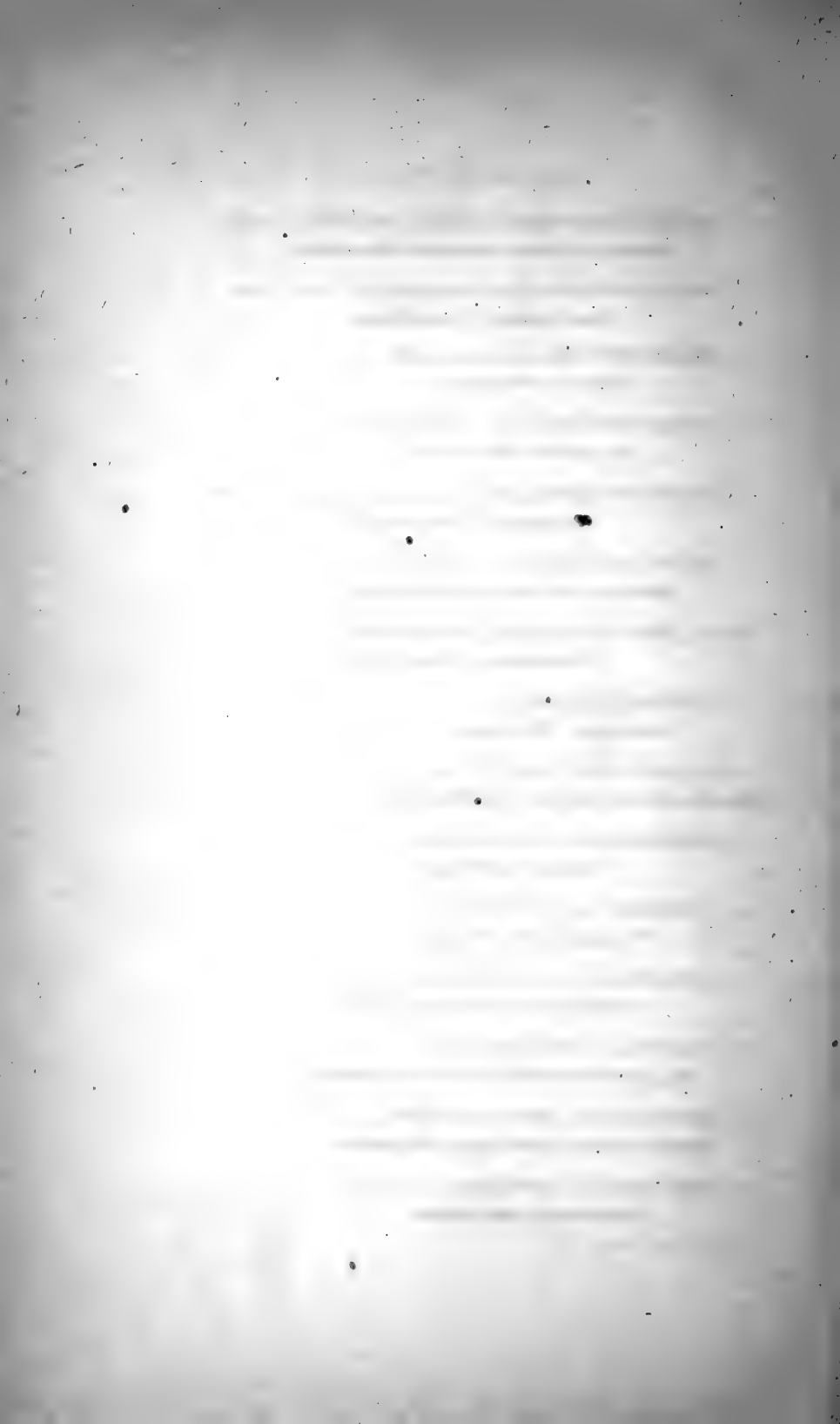
- 31b. **PARUS ATRICAPILLUS L.**,  
*var. CAROLINENSIS* (Aud.) Cs.  
**Carolina Chickadee.**
- 31c. **PARUS ATRICAPILLUS L.**,  
*var. OCCIDENTALIS* (Bd.) Cs.  
**Western Chickadee.**
32. **PARUS MONTANUS GAMB.**  
**Mountain Chickadee.**
33. **PARUS HUDSONICUS FORSTER.**  
**Hudsonian Chickadee.**
34. **PARUS RUFESCENS TOWNS.**  
**Chestnut-backed Chickadee.**
35. **PSALTRIPARUS MINIMUS (TOWNS.) BP.**  
**Least Titmouse.**
36. **PSALTRIPARUS PLUMBEUS BD.**  
**Plumbeous Titmouse.**
37. **AURIPARUS FLAVICEPS (SUND.)BD.**  
**Yellow-headed Titmouse.**
38. **SITTA CAROLINENSIS GM.**  
**White-bellied Nuthatch.**
- 38a. **SITTA CAROLINENSIS GM.**,  
*var. ACULEATA* (Cass.) All.  
**Slender-billed Nuthatch.**
39. **SITTA CANADENSIS L.**  
**Red-bellied Nuthatch.**
40. **SITTA PUSILLA LATH.**  
**Brown-headed Nuthatch.**
- 41? **SITTA PYGMÆA VIG.**  
**Pygmy Nuthatch.**
42. **CERTHIA FAMILIARIS L.**  
**Brown Creeper.**



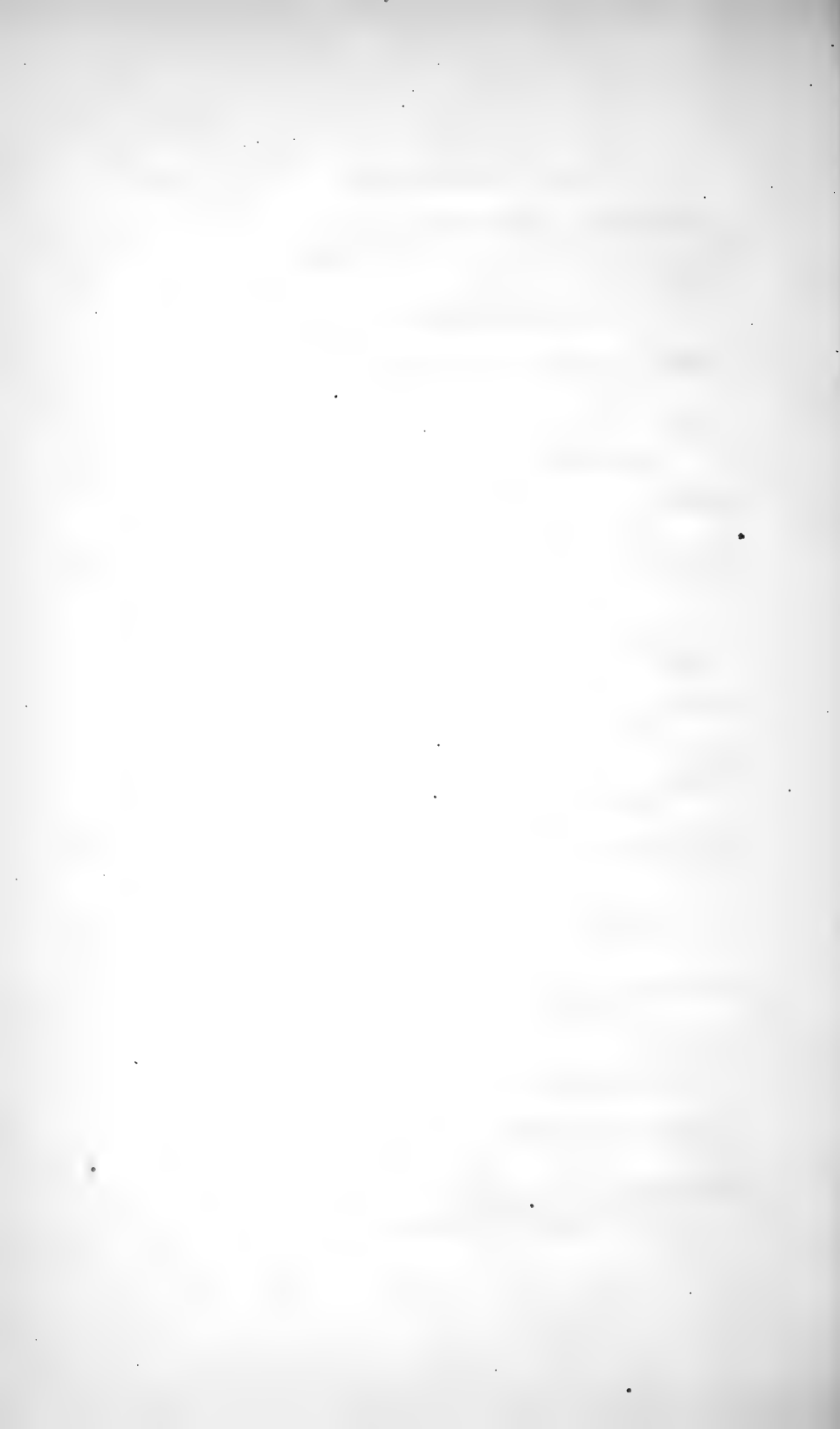
43. **CAMPYLORHYNCHUS**  
**BRUNNEICAPILLUS** (LAFR.) GR.  
**Brown-headed Creeper-wren.**
44. **CAMPYLORHYNCHUS AFFINIS** XANTUS.  
**Allied Creeper-wren.**
45. **SALPINCTES OBSOLETUS** (SAY) CAB.  
**Rock Wren.**
46. **CATHERPES MEXICANUS** (SW.) BD.  
**White-throated Wren.**
47. **THRYOTHORUS LUDOVICIANUS** (GM.) BP.  
**Great Carolina Wren.**
- 47a. **THRYOTHORUS LUDOVICIANUS** (GM.) BP.,  
*var. BERLANDIERI* (Couch) Cs.  
**Berlandier's Wren.**
48. **THRYOTHORUS BEWICKII** (AUD.) BP.  
**Bewick's Wren.**
- 48a. **THRYOTHORUS BEWICKII** (AUD.) BP.  
*var. LEUCOGASTER* (Gould) Bd.  
**White-bellied Wren.**
- 48b. **THRYOTHORUS BEWICKII** (AUD.) BP.,  
*var. SPILURUS* (Vig.) Bd.  
**Speckled-tailed Wren.**
49. **TROGLODYTES AEDON** V.  
**House Wren.**
- 49a. **TROGLODYTES AEDON** V.,  
*var. PARKMANNI* (Aud.) Cs.  
**Western House Wren.**
50. **ANORTHURA TROGLODYTES** (L.) Cs.,  
*var. HYEMALIS* (Wils.) Cs.  
**Winter Wren.**



- 50a. **ANORTHURA TROGLODYTES** (L.) Cs.,  
*var. ALASCENSIS* (Bd.) Cs.  
**Alaskan Wren.**
51. **TELMATODYTES PALUSTRIS** (WILS.) CAB.  
**Long-billed Marsh Wren.**
52. **CISTOTHORUS STELLARIS** (LICHT.) CAB.  
**Short-billed Marsh Wren.**
53. **EREMOPHILA ALPESTRIS** (FORST.) BOIE.  
**Horned Lark; Shore Lark.**
- 53a. **EREMOPHILA ALPESTRIS** (FORST.) BOIE,  
*var. CHRYSOLEMA* (Wagl.) Bd.  
**South-western Lark.**
54. **BUDYTES FLAVA** (L.) CUV.  
**Yellow Wagtail.**
55. **ANTHUS LUDOVICIANUS** (GM.) LICHT.  
**Brown Lark; Titlark; Pipit.**
56. **NEOCORYS SPRAGUEI** (AUD.) SCL.  
**Missouri Skylark.**
57. **MNIOTILTA VARIA** (L.) V.  
**Black-and-white Creeper.**
58. **PARULA AMERICANA** (L.) BP.  
**Blue yellow-backed Warbler.**
59. **PROTONOTARIA CITRÆA** (BODD.) BD.  
**Prothonotary Warbler.**
60. **HELMITHERUS VERMIVORUS** (GM.) BP.  
**Worm-eating Warbler.**
61. **HELMITHERUS SWAINSONI** (AUD.) BP.  
**Swainson's Warbler.**
62. **HELMINTHOPHAGA PINUS** (L.) BD.  
**Blue-winged Yellow Warbler.**



63. *HELMINTHOPHAGA CHRYSOPTERA* (L.) BD.  
**Blue Golden-winged Warbler.**
64. *HELMINTHOPHAGA BACHMANI* (AUD.) CAB.  
**Bachman's Warbler.**
65. *HELMINTHOPHAGA LUCIÆ* COOP.  
**Lucy's Warbler.**
66. *HELMINTHOPHAGA VIRGINIÆ* BD.  
**Virginia's Warbler.**
67. *HELMINTHOPHAGA RUFICAPILLA* (WILS.) BD.  
**Nashville Warbler.**
68. *HELMINTHOPHAGA CELATA* (SAY) BD.  
**Orange-crowned Warbler.**
69. *HELMINTHOPHAGA PEREGRINA* (WILS.) CAB.  
**Tennessee Warbler.**
70. *DENDRÆCA ÆSTIVA* (GM.) BD.  
**Summer Warbler.**
71. *DENDRÆCA VIRENS* (GM.) BD.  
**Black-throated Green Warbler.**
72. *DENDRÆCA OCCIDENTALIS* (TOWNS.) BD.  
**Western Warbler.**
73. *DENDRÆCA TOWNSENDII* (NUTT.) BD.  
**Townsend's Warbler.**
74. *DENDRÆCA CHRYSOPAREIA* SCL. ET SALV.  
**Golden-cheeked Warbler.**
75. *DENDRÆCA NIGRESCENS* (TOWNS.) BD.  
**Black-throated Gray Warbler.**
76. *DENDRÆCA CÆRULESCENS* (L.) BD.  
**Black-throated Blue Warbler.**
77. *DENDRÆCA CÆRULEA* (WILS.) BD.  
**Cærulean Warbler.**





78. *DENDRŒCA CORONATA* (L.) GR.  
**Yellow-rumped Warbler; Myrtle Bird.**
79. *DENDRŒCA AUDUBONII* (TOWNS.) BD.  
**Audubon's Warbler.**
80. *DENDRŒCA BLACKBURNIÆ* (GM.) BD.  
**Blackburnian Warbler.**
81. *DENDRŒCA STRIATA* (FORST.) BD.  
**Black-poll Warbler.**
82. *DENDRŒCA CASTANEA* (WILS.) BD.  
**Bay-breasted Warbler.**
83. *DENDRŒCA PENNSYLVANICA* (L.) BD.  
**Chestnut-sided Warbler.**
84. *DENDRŒCA MACULOSA* (GM.) BD.  
**Black-and-Yellow Warbler.**
85. *DENDRŒCA TIGRINA* (GM.) BD.  
**Cape May Warbler.**
86. *DENDRŒCA DISCOLOR* (V.) BD.  
**Prairie Warbler.**
87. *DENDRŒCA GRACIÆ* COUES.  
**Grace's Warbler.**
88. *DENDRŒCA DOMINICA* (L.) BD.  
**Yellow-throated Warbler.**
89. *DENDRŒCA KIRTLANDI* BD.  
**Kirtland's Warbler.**
90. *DENDRŒCA PALMARUM* (GM.) BD.  
**Yellow Red-poll Warbler.**
91. *DENDRŒCA PINUS* (WILS.) BD.  
**Pine-creeping Warbler.**
92. *SEIURUS AUROCAPILLUS* (L.) SW.  
**Golden-crowned Thrush.**

THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF CHEMISTRY

PH.D. THESIS

BY

ROBERT M. WAYNE

1963

PHYSICAL CHEMISTRY

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UNIVERSITY OF CHICAGO

CHICAGO, ILLINOIS

1963

PH.D. THESIS

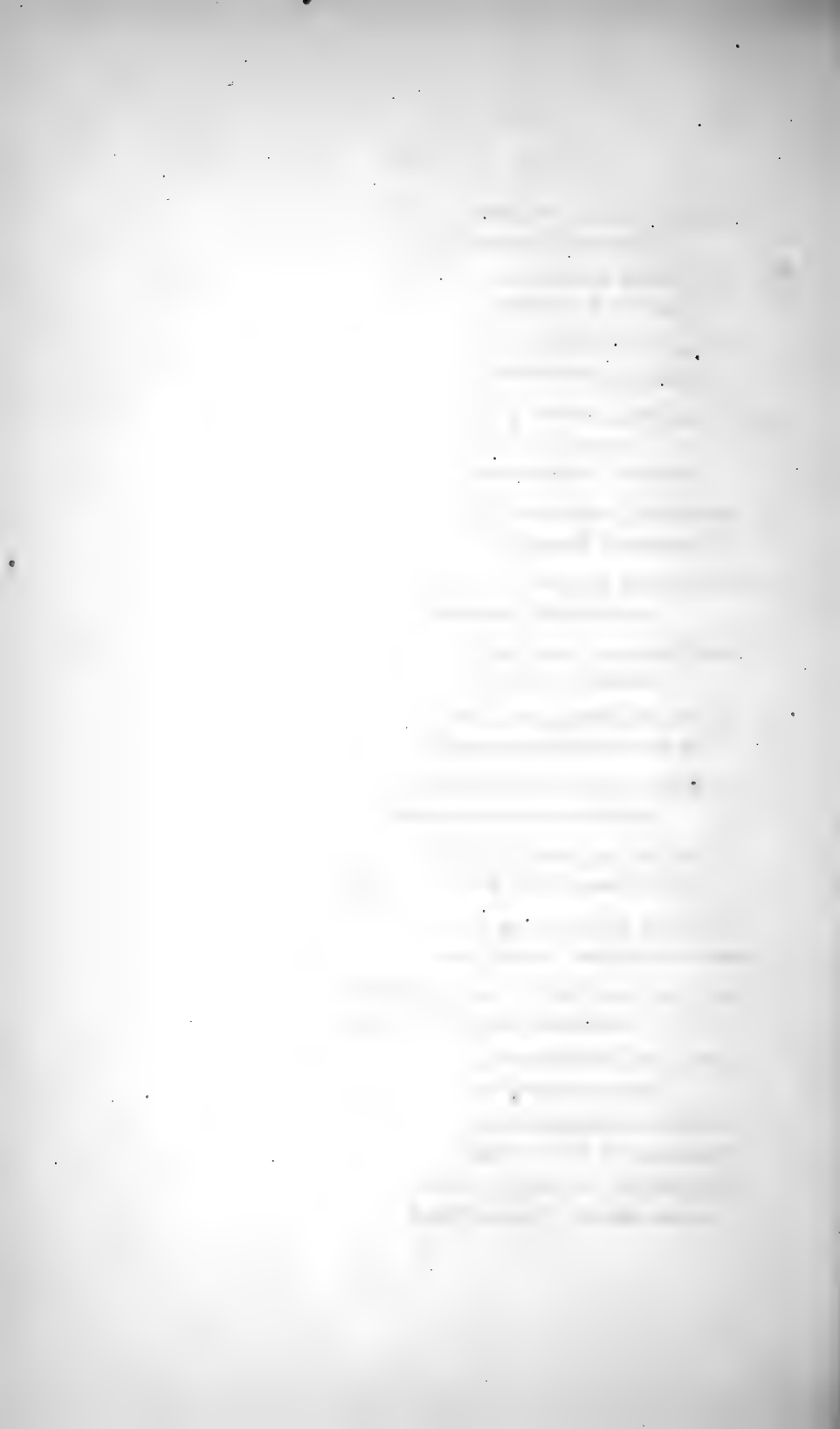
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93. *SEIURUS NOVEBORACENSIS* (GM.) NUTT.  
**Water Wagtail; Water Thrush.**
94. *SEIURUS LUDOVICIANUS* (V.) BP.  
**Large-billed Water Thrush.**
95. *OPORORNIS AGILIS* (WILS.) BD.  
**Connecticut Warbler.**
96. *OPORORNIS FORMOSUS* (WILS.) BD.  
**Kentucky Warbler.**
97. *GEOTHLYPIS TRICHAS* (L.) CAB.  
**Maryland Yellow-throat.**
98. *GEOTHLYPIS PHILADELPHIA* (WILS.) BD.  
**Mourning Warbler.**
- 99?\* *GEOTHLYPIS MACGILLIVRAYI* (AUD.) BD.  
**Macgillivray's Warbler.**
- \* 100. *ICTERIA VIRENS* (L.) BD.  
**Yellow-breasted Chat.**
- 100a. *ICTERIA VIRENS* (L.) BD.,  
*var. LONGICAUDA* (LAWT.) CS.  
**Long-tailed Chat.**
101. *MYIODIOCTES MITRATUS* (GM.) AUD.  
**Hooded Flycatching Warbler.**
102. *MYIODIOCTES PUSILLUS* (WILS.) BP.  
**Green Black-capped Flycatching Warbler.**
103. *MYIODIOCTES CANADENSIS* (L.) AUD.  
**Canadian Flycatching Warbler.**
104. *SETOPHAGA RUTICILLA* (L.) SW.  
**Redstart.**
105. *SETOPHAGA PICTA* SW.  
**Painted Flycatcher.**

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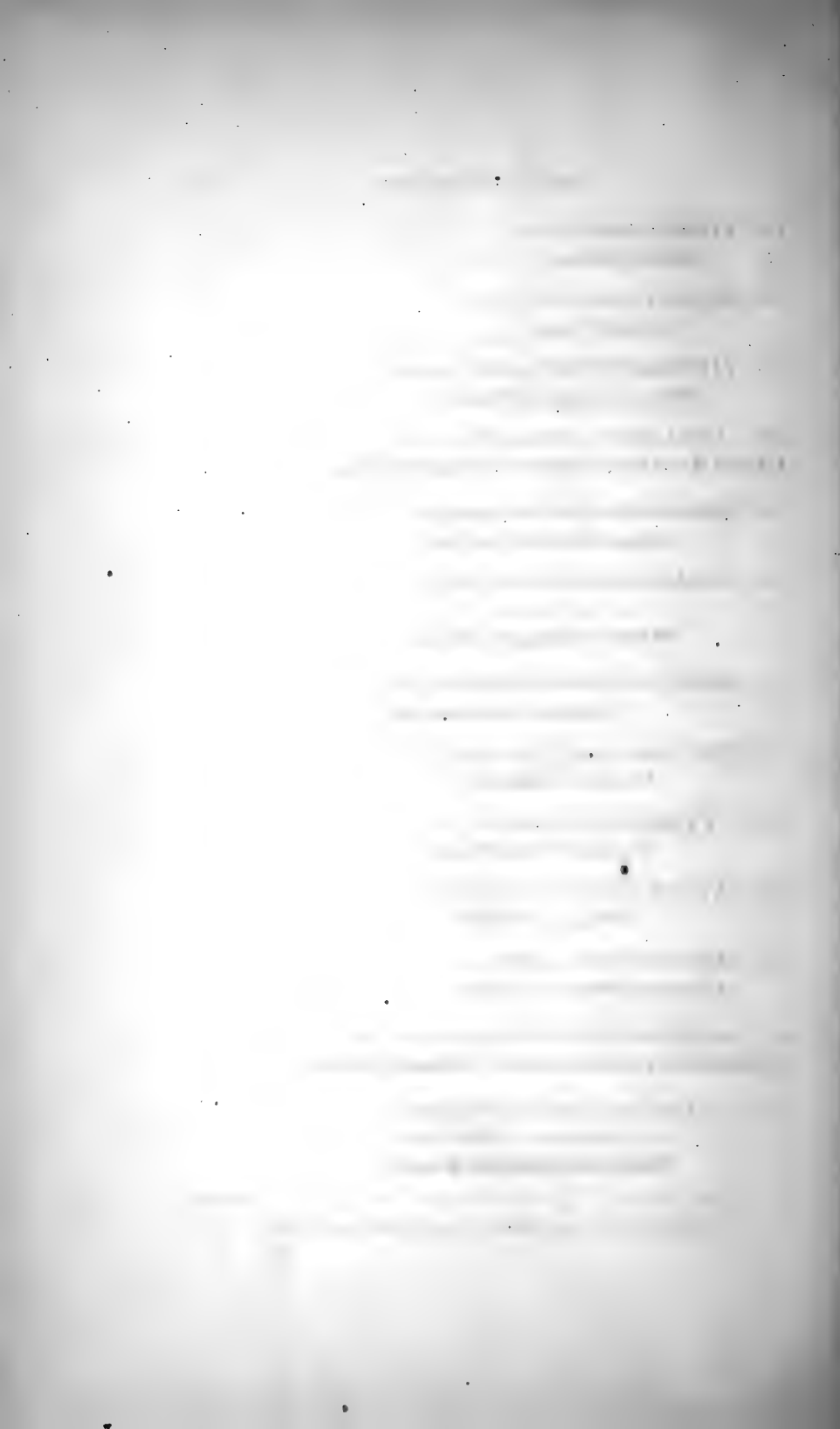
\*This is probably only a variety of 98.



106. *CERTHIOLA FLAVEOLA* (L.) SUND.  
**Honey Creeper.**
107. *PYRANGA RUBRA* (L.) V.  
**Scarlet Tanager.**
108. *PYRANGA ÆSTIVA* (L.) V.  
**Summer Redbird.**
- 108a. *PYRANGA ÆSTIVA* (L.) V.,  
*var. COOPERI* (Ridg.) Cs.  
**Cooper's Tanager.**
109. *PYRANGA HEPATICA* Sw.  
**Hepatic Tanager.**
110. *PYRANGA LUDOVICIANA* (WILS.) BP.  
**Louisiana Tanager.**
111. *HIRUNDO HORREORUM* BARTON.  
**Barn Swallow.**
112. *TACHYGINETA BICOLOR* (V.) Cs.  
**White-bellied Swallow.**
113. *TACHYGINETA THALASSINA* (Sw.) CAB.  
**Violet-green Swallow.**
114. *PETROCHELIDON LUNIFRONS* (SAY) CAB.  
**Cliff Swallow; Eave Swallow.**
115. *COTYLE RIPARIA* (L.) BOIE.  
**Bank Swallow; Sand Martin.**
116. *STELGIDOPTERYX SERRIPENNIS* (AUD.) BD.  
**Rough-winged Swallow.**
117. *PROGNE PURPUREA* (L.) BOIE.  
**Purple Martin.**
118. *AMPELIS GARRULUS* L.  
**Bohemian Waxwing.**
119. *AMPELIS CEDRORUM* (V.) BD.  
**Cedar Bird; Cherry Bird.**

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120. **PHÆNOPEPLA NITENS** (Sw.) SCL.  
**Black Ptilogonys.**
121. **MYIADESTES TOWNSENDII** (AUD.) CAB.  
**Townsend's Flycatching Thrush.**
122. **VIREO OLIVACEUS** (L.) V.  
**Red-eyed Vireo.**
123. **VIREO ALTILOQUUS** (V.) GR.,  
*var. BARBATULUS* (Cab.) Cs.  
**Black-whiskered Vireo.**
124. **VIREO PHILADELPHICUS** CASS.  
**Brotherly-love Vireo.**
125. **VIREO GILVUS** (V.) BP.  
**Warbling Vireo.**
- 125a. **VIREO GILVUS** (V.) BP.  
*var. SWAINSONI* (Bd.) Cs.  
**Western Warbling Vireo.**
126. **VIREO FLAVIFRONS** V.  
**Yellow-throated Vireo.**
127. **VIREO SOLITARIUS** (WILS.) V.  
**Blue-headed Vireo; Solitary Vireo.**
- 127a. **VIREO SOLITARIUS** V.,  
*var. PLUMBEUS* (Cs.) All.  
**Plumbeous Vireo.**
- 128? **VIREO VICINIOR** COUES.  
**Gray Vireo.**
129. **VIREO NOVEBORACENSIS** (GM.) BP.  
**White-eyed Vireo.**
- 130? **VIREO HUTTONI** CASS.  
**Hutton's Vireo.**





131. VIREO BELLII AUD.  
**Bell's Vireo.**
132. VIREO PUSILLUS COUES.  
**Least Vireo.**
133. VIREO ATRICAPILLUS WOODH.  
**Black-headed Vireo.**
134. COLLURIO BOREALIS (V.) BD.  
**Great Northern Shrike; Butcherbird.**
135. COLLURIO LUDOVICIANUS (L.) BD.  
**Loggerhead Shrike.**
- 135a. COLLURIO LUDOVICIANUS (L.) BD.,  
*var. EXCUBITOROIDES* (Sw.) Cs.  
**White-rumped Shrike.**
136. HESPERIPHONA VESPERTINA (COOP.) BP.  
**Evening Grosbeak.**
137. PINICOLA ENUCLEATOR (L.) V.  
**Pine Grosbeak.**
- [138.]? PYRRHULA CASSINI (BD.) TRISTR.  
**Cassin's Bullfinch.**
139. CARPODACUS PURPUREUS (GM.) GR.  
**Purple Finch.**
140. CARPODACUS CASSINI BD.  
**Cassin's Purple Finch.**
141. CARPODACUS FRONTALIS (SAY) GR.  
**Crimson-fronted Finch; House Finch.**
- 141a.\* CARPODACUS FRONTALIS (SAY) CAB.,  
*var. HÆMORRHOUS* (Wagl.) Ridg.  
**Mexican Purple Finch.**

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\*Not in the Key. See Ridgway, Am. Jour. Sci. Art, v, p. 39.



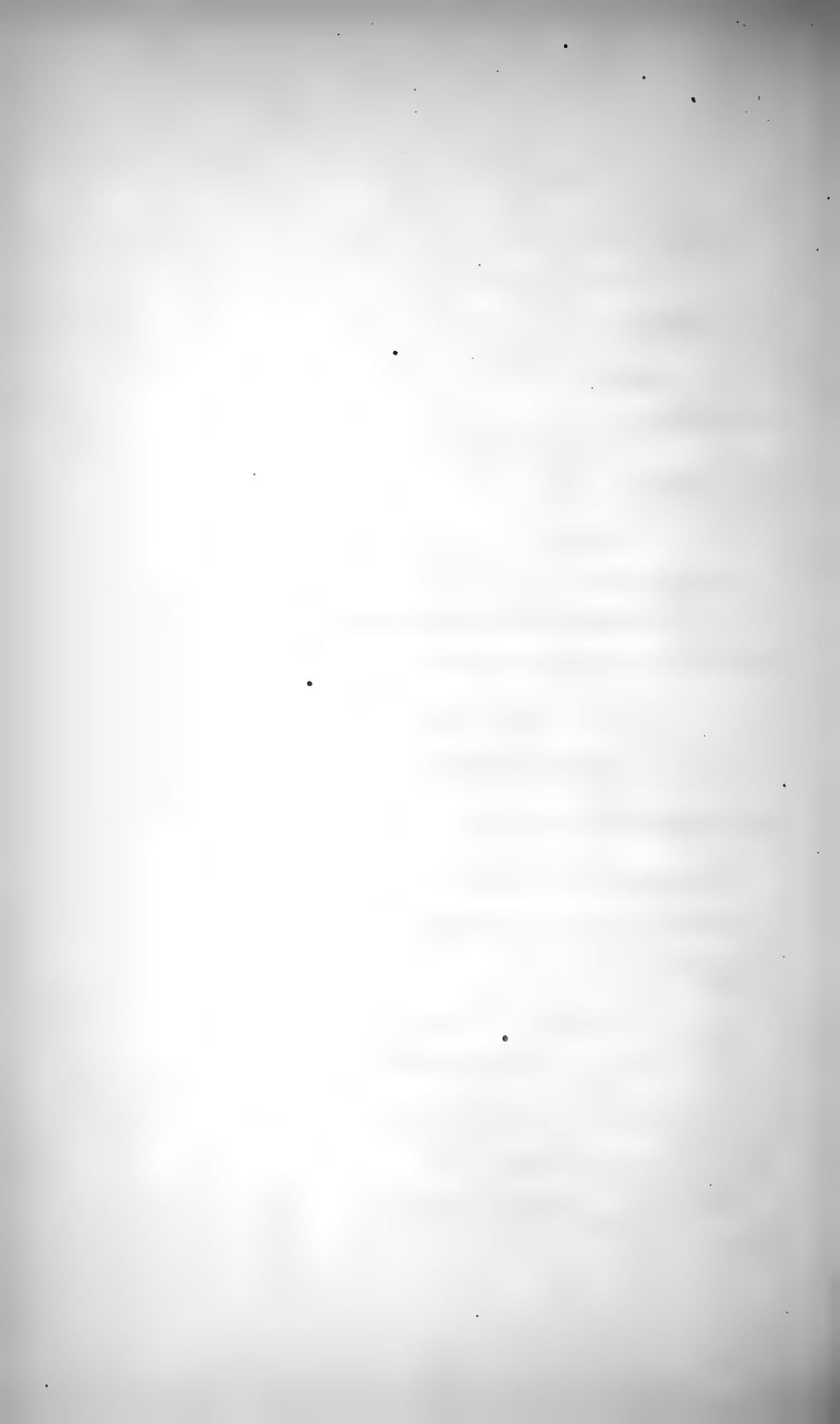
142. *LOXIA LEUCOPTERA* (WILS.),  
**White-winged Crossbill.**
143. *LOXIA CURVIROSTRA* L.,  
*var. AMERICANA* (Wils.) Cs.  
**Common Crossbill.**
- 143a. *LOXIA CURVIROSTRA* L.,  
*var. MEXICANA* (Strickl.) Cs.  
**Large-billed Crossbill.**
144. *LEUCOSTICTE TEPHROCOTIS* SW.  
**Gray-crowned Finch.**
- 144a. *LEUCOSTICTE TEPHROCOTIS* SW.,  
*var. GRISEINUCHA* (Brandt) Cs.  
**Gray-eared Finch.**
145. *LEUCOSTICTE ARCTOA* (PALL.) BP.  
**Siberian Finch.**
146. *ÆGIOTHUS LINARIA* (L.) CAB.  
**Red-poll Linnet.**
- 146a. *ÆGIOTHUS LINARIA* (L.) CAB.  
*var. FUSCESCENS* Cs.  
**Dusky Red-poll.**
- 146b. *ÆGIOTHUS LINARIA* (L.) CAB.  
*var. EXILIPES* Cs.  
**American Mealy Red-poll.**
- [147.] *LINOTA FLAVIROSTRIS* (L.) BP.  
*var. BREWSTERI* (Ridg.) Cs.  
**Brewster's Linnet.**
148. *CHRYSOMITRIS PINUS* (WILS.) BP.  
**Pine Linnet.**
149. *CHRYSOMITRIS TRISTIS* (L.) BP.  
**American Goldfinch; Yellowbird.**



150. *CHRYSOMITRIS LAWRENCEI* (CASS.) BP.  
**Lawrence's Goldfinch.**
151. *CHRYSOMITRIS PSALTRIA* (SAY) BP.  
**Arkansas Goldfinch.**
- 151a. *CHRYSOMITRIS PSALTRIA* (SAY) BP.,  
*var. ARIZONÆ* CS.  
**Arizona Goldfinch.**
- 151b. *CHRYSOMITRIS PSALTRIA* (SAY) BP.,  
*var. MEXICANA* (SW.) CS.  
**Mexican Goldfinch.**
152. *PLECTROPHANES NIVALIS* (L.) MEYER.  
**Snow Bunting.**
153. *PLECTROPHANES LAPPONICUS* (L.) SELBY.  
**Lapland Longspur.**
154. *PLECTROPHANES PICTUS* SW.  
**Painted Lark Bunting.**
155. *PLECTROPHANES ORNATUS* TOWNS.  
**Chestnut-colored Lark Bunting.**
156. *PLECTROPHANES MACCOWNII* LAW.  
**McCown's Lark Bunting.**
- † • 157? *CENTRONYX BAIRDII* (AUD.) BD.  
**Baird's Bunting.**
- † 157bis.\* *CENTRONYX OCHROCEPHALUS* AIKEN.  
**Ochreous-headed Bunting.**
158. *PASSERCULUS PRINCEPS* MAYNARD.  
**Maynard's Sparrow.**
159. *PASSERCULUS SAVANNA* (WILS.) BP.  
**Savanna Sparrow.**

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\* Not in the Key. See Aiken, Am. Nat., vii, 237.



- 159a. **PASSERCULUS SAVANNA** (WILS.) BP.,  
*var. ANTHINUS* (BP.) CS.  
**Titlark Sparrow.**
- + 159b. **PASSERCULUS SAVANNA** (WILS.) BP.,  
*var. SANDVICENSIS* (GM.) CS.  
**Northwestern Sparrow.**
160. **PASSERCULUS ROSTRATUS** (CASS.) BD.  
**Beaked Sparrow.**
- + 160a. **PASSERCULUS ROSTRATUS** (CASS.) BD.,  
*var. GUTTATUS* (LAWR.) CS.  
**St. Lucas Sparrow.**
161. **POECETES GRAMINEUS** (GM.) BD.  
**Bay-winged Bunting; Grass Finch.**
- 161a. **POECETES GRAMINEUS** (GM.) BD.,  
*var. CONFINIS* Bd.  
**Western Grass Finch.**
- + 162. **COTURNICULUS PASSERINUS** (WILS.) BP.  
**Yellow-winged Sparrow.**
- 162a. **COTURNICULUS PASSERINUS** (WILS.) BP.,  
*var. PERPALLIDUS* Ridg.  
**Bleached Yellow-winged Sparrow.**
163. **COTURNICULUS HENSLOWI** (AUD.) BP.  
**Henslow's Sparrow.**
- + 164. **COTURNICULUS LECONTEI** (AUD.) BP.  
**LeConte's Sparrow.**
165. **AMMODROMUS MARITIMUS** (WILS.) SW.  
**Seaside Finch.**
166. **AMMODROMUS CAUDACUTUS** (GM.) SW.  
**Sharp-tailed Finch.**
167. **MELOSPIZA LINCOLNI** (AUD.) BD.  
**Lincoln's Finch.**





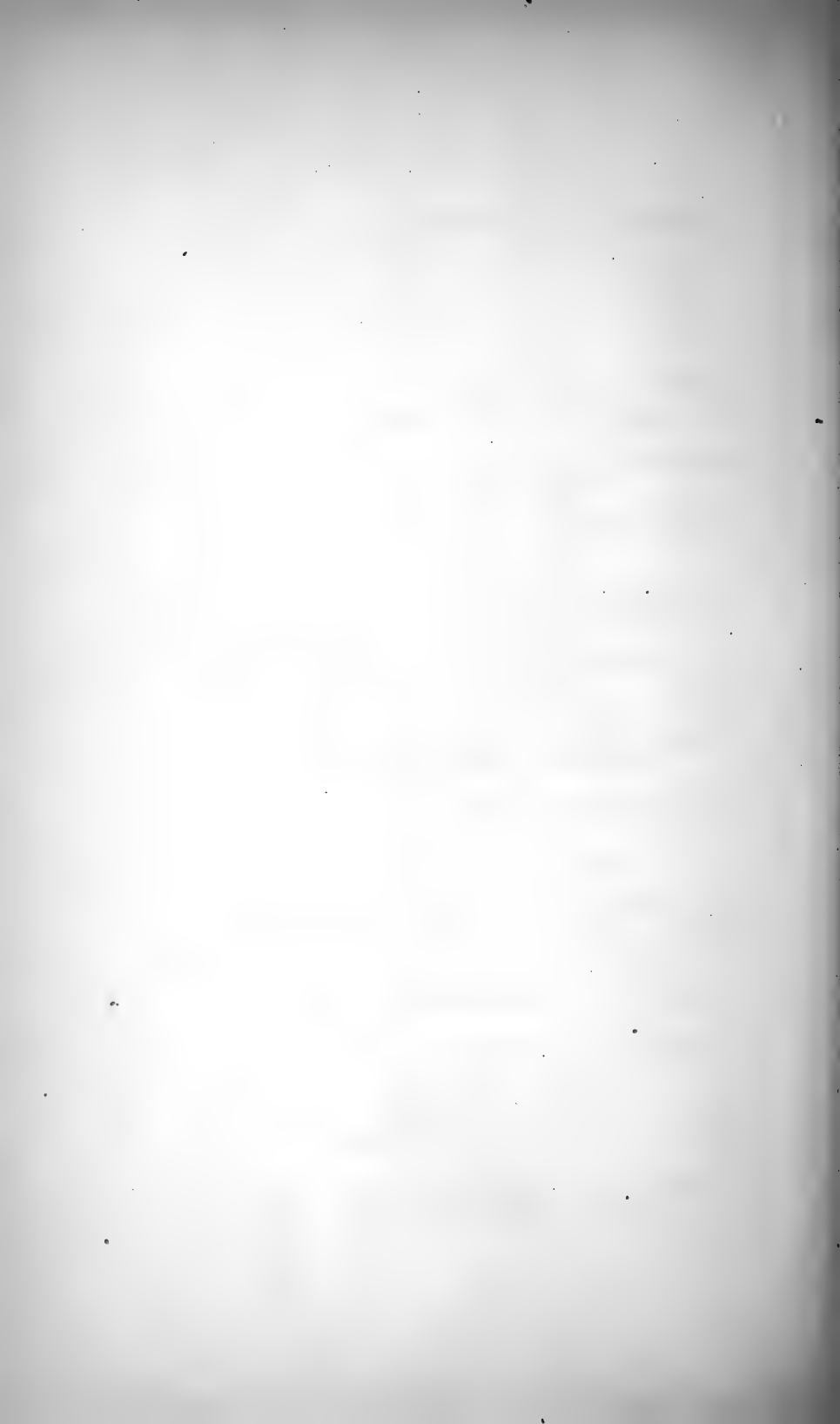
168. **MELOSPIZA PALUSTRIS** (WILS.) BD.  
**Swamp Sparrow.**
169. **MELOSPIZA MELODIA** (WILS.) BD.  
**Song Sparrow.**
- 169a. **MELOSPIZA MELODIA** (WILS.) BD.,  
*var. FALLAX* (Bd.) Ridg.  
**Gray Song Sparrow.**
- 169b. **MELOSPIZA MELODIA** (WILS.) BD.,  
*var. GUTTATA* (Nutt.) Ridg.  
**Cinereous Song Sparrow.**
- 169c. **MELOSPIZA MELODIA** (WILS.) BD.,  
*var. RUFINA* (Brandt.) Ridg.  
**Rufous Song Sparrow.**
- 169d. **MELOSPIZA MELODIA** (WILS.) BD.,  
*var. HEERMANNI* (Bd.) Ridg.  
**Heermann's Song Sparrow.**
- 169e. **MELOSPIZA MELODIA** (WILS.) BD.,  
*var. GOULDII* (Bd.) Ridg.  
**Gould's Song Sparrow.**
- 169f. **MELOSPIZA MELODIA** (WILS.) BD.,  
*var. INSIGNIS* (Bd.) Ridg.  
**Bischoff's Song Sparrow.**
170. **PEUCÆA ÆSTIVALIS** (LICHT.) CAB.  
**Bachman's Finch.**
- 170a. **PEUCÆA ÆSTIVALIS** (LICHT.) CAB.,  
*var. CASSINI* (Woodh.) All.  
**Cassin's Finch.**
171. **PEUCÆA RUFICEPS** (CASS.) BD.  
**Rufous-crowned Finch.**
- 171bis.\* **PEUCÆA CARPALIS** COUES.  
**Rufous-winged Sparrow.**

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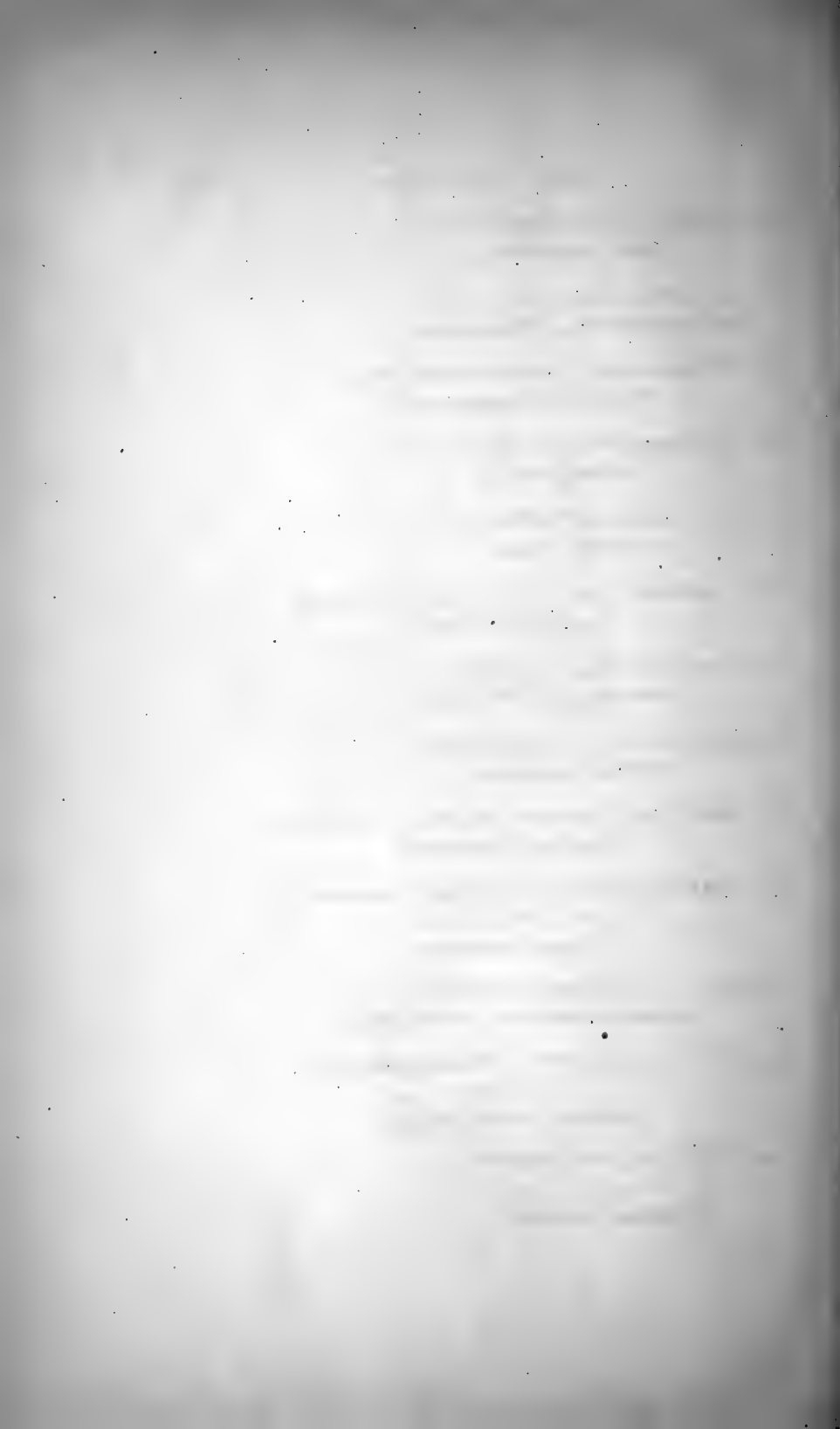
\*Not in the Key. See Am. Nat., vii, p. 322.



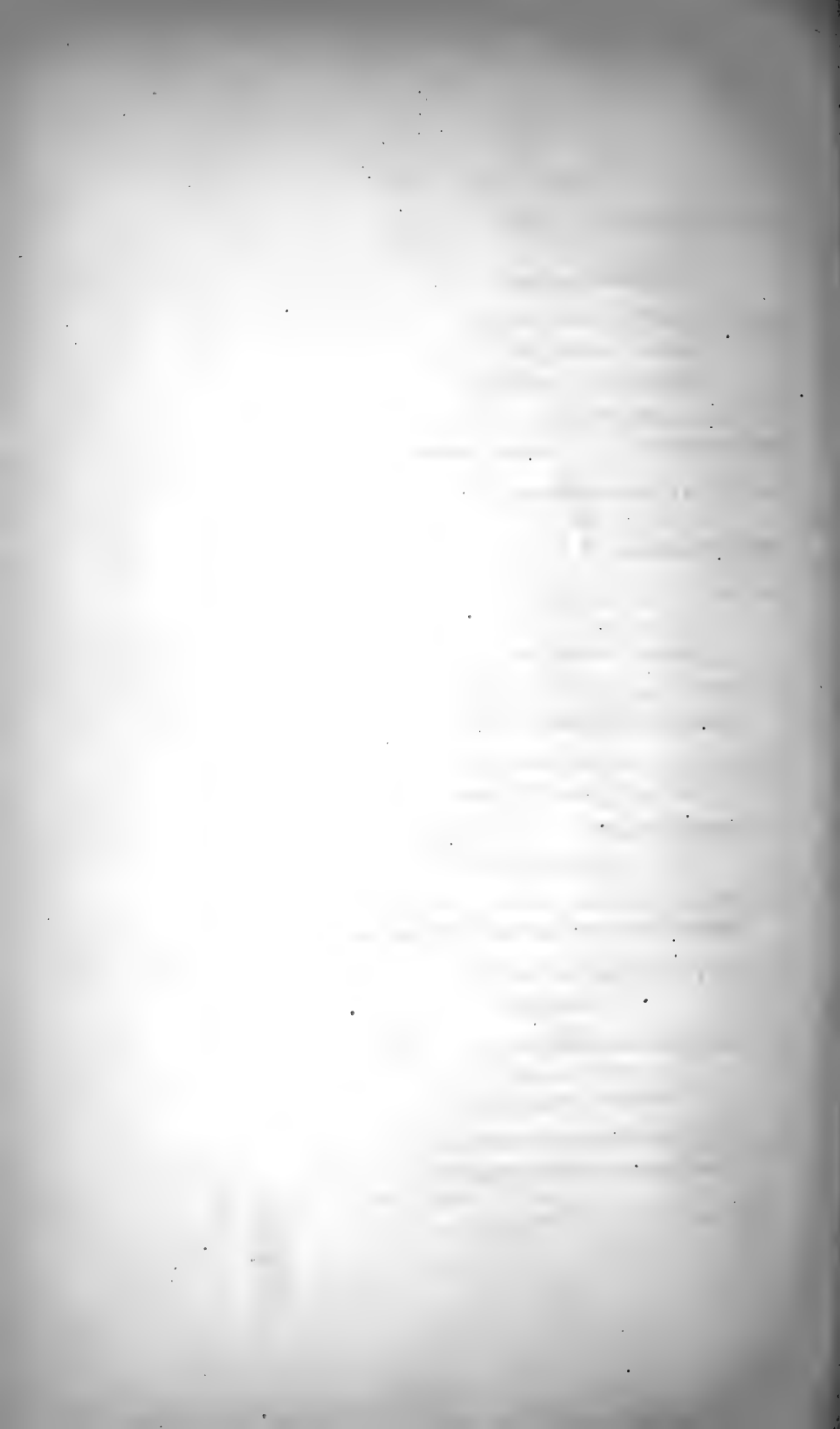
172. *POOSPIZA BILINEATA* (CASS.) SCL.  
**Black-throated Finch.**
173. *POOSPIZA BELLI* (CASS.) SCL.  
**Bell's Finch.**
174. *JUNCO HYEMALIS* (L.) SCL.  
**Snowbird.**
- 175? *JUNCO OREGONUS* (TOWNS.) SCL.  
**Oregon Snowbird.**
- 176? *JUNCO CINEREUS* (SW.) CAB.,  
*var. CANICEPS* (WOODH.) CS.  
**Cinereous Snowbird.**
177. *SPIZELLA MONTICOLA* (GM.) BD.  
**Tree Sparrow.**
178. *SPIZELLA SOCIALIS* (WILS.) BP.  
**Chipping Sparrow.**
- 178a. *SPIZELLA SOCIALIS* (WILS.) BP.,  
*var. ARIZONÆ* CS.  
**Arizona Chipping Sparrow.**
179. *SPIZELLA PUSILLA* (WILS.) BP.  
**Field Sparrow.**
180. *SPIZELLA PALLIDA* (SW.) BP.  
**Clay-colored Sparrow.**
- 180a. *SPIZELLA PALLIDA* (SW.) BP.,  
*var. BREWERI* (CASS.) CS.  
**Brewer's Sparrow.**
181. *SPIZELLA ATRIGULARIS* (CAB.) BD.  
**Black-chinned Sparrow.**
182. *ZONOTRICHIA ALBICOLLIS* (GM.) BP.  
**White-throated Sparrow.**



183. ZONOTRICHIA LEUCOPHRYS (FORST.) SW.  
**White-crowned Sparrow.**
- 183a. ZONOTRICHIA LEUCOPHRYS (FORST.) SW.,  
*var.* GAMBELI (Nutt.) All.  
**Gambel's Sparrow.**
184. ZONOTRICHIA CORONATA (PALL.) BD.  
**Golden-crowned Sparrow.**
185. ZONOTRICHIA QUERULA (NUTT.) GAMB.  
**Harris's Sparrow.**
186. CHONDESTES GRAMMACA (SAY) BP.  
**Lark Finch.**
- [187.] PASSER DOMESTICUS LINN.  
**English Sparrow.**
188. PASSERELLA ILIACA (MERREM.) SW.  
**Fox Sparrow.**
189. PASSERELLA TOWNSENDII (AUD.) NUTT.  
**Townsend's Fox Sparrow.**
- 189a. PASSERELLA TOWNSENDII (AUD.) NUTT.,  
*var.* SCHISTACEA (Bd.) Cs.  
**Slate-colored Fox Sparrow.**
190. CALAMOSPIZA BICOLOR (TOWNS.) BP.  
**Lark Bunting; White-winged Blackbird.**
191. EUSPIZA AMERICANA (GM.) BP.  
**Black-throated Bunting.**
- 192? EUSPIZA TOWNSENDII (AUD.) BP.  
**Townsend's Bunting.**
193. GONIAPHEA LUDOVICIANA (L.) BOWDICH.  
**Rose-breasted Grosbeak.**
194. GONIAPHEA MELANOCEPHALA (SW.) —.  
**Black-headed Grosbeak.**



195. GONIAPHEA CÆRULEA (L.).  
**Blue Grosbeak.**
196. CYANOSPIZA CIRIS (L.) BD.  
**Painted Finch; Nonpareil.**
197. CYANOSPIZA VERSICOLOR (BP.) BD.  
**Western Nonpareil.**
198. CYANOSPIZA AMCENA (SAY) BD.  
**Lazuli Finch.**
199. CYANOSPIZA CYANEA (L.) BD.  
**Indigo Bird.**
- [200.] SPERMOPHILA MORELETII PUCHERAN.  
**Morelet's Finch.**
- [201.] PHONIPARA BICOLOR (L.) BP.  
**Black-faced Finch.**
202. PYRRHULOXIA SINUATA BP.  
**Texas Cardinal.**
203. CARDINALIS VIRGINIANUS (BRISSON) BP.  
**Cardinal Redbird.**
- 203a. CARDINALIS VIRGINIANUS (BRISSON) BP.,  
*var. IGNEUS* (Bd.) Cs.  
**Fiery Redbird.**
204. PIPILO ERYTHROPTHALMUS (L.) V.  
**Towhee Bunting; Chewink.**
- 204a. PIPILO ERYTHROPTHALMUS (L.) V.,  
*var. ALLENI* Cs.  
**White-eyed Towhee.**
205. PIPILO MACULATUS SW.,  
*var. OREGONUS* (Bell) Cs.  
**Oregon Towhee.**





- 205a. **PIPILO MACULATUS** Sw.,  
*var. ARCTICUS* (Sw.) Cs.  
**Arctic Towhee.**
- 205b. **PIPILO MACULATUS** Sw.,  
*var. MEGALONYX* (Bd.) Cs.  
**Spurred Towhee.**
206. **PIPILO FUSCUS** Sw.  
**Brown Towhee; Canon Finch.**
- 206a. **PIPILO FUSCUS** Sw.,  
*var. ALBIGULA* (Bd.) Cs.  
**White-throated Towhee.**
- 206b. **PIPILO FUSCUS** Sw.,  
*var. CRISSALIS* (Vig.) Cs.  
**Crissal Towhee.**
207. **PIPILO ABERTI** Bd.  
**Abert's Towhee.**
208. **PIPILO CHLORURUS** (TOWNS.) Bd.  
**Green-tailed Towhee.**
209. **EMBERNAGRA RUFIVIRGATA** LAWR.  
**Green Finch.**
210. **DOLICHONYX ORYZIVORUS** (L.) Sw.  
**Bobolink; Reedbird; Ricebird.**
- 211.\* **MOLOTHRUS PECORIS** (Gm.) Sw.  
**Cowbird.**
- 211a. **MOLOTHRUS PECORIS** (Gm.) Sw.,  
*var. OBSCURUS* (Gm.) Cs.  
**Dwarf Cowbird.**
212. **AGELÆUS PHŒNICEUS** (L.) V.  
**Red-winged Blackbird.**

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\*This should stand as *Molothrus ater* (Gm.) Gr.



- 212a. *AGELÆUS PHENICEUS* (L.) V.,  
*var. GUBERNATOR* (Wagl.) Cs.

**Red-shouldered Blackbird.**

- 212b. *AGELÆUS PHENICEUS* (L.) V.,  
*var. TRICOLOR* (Nutt.) Cs.

**Red-and-white-shouldered Blackbird.**

213. *XANTHOCEPHALUS ICTEROCEPHALUS* (Bp.) Bd.  
**Yellow-headed Blackbird.**

214. *STURNELLA MAGNA* (L.) Sw.  
**Fieldlark; Meadowlark.**

- 214a. *STURNELLA MAGNA* (L.) Sw.,  
*var. NEGLECTA* (Aud.) All.  
**Western Fieldlark.**

215. *ICTERUS SPURIUS* (L.) Bp.  
**Orchard Oriole.**

- 215a. *ICTERUS SPURIUS* (L.) Bp.,  
*var. AFFINIS* (Lawr.) Cs.  
**Texan Orchard Oriole.**

216. *ICTERUS BALTIMORE* (L.) DANDIN.  
**Baltimore Oriole.**

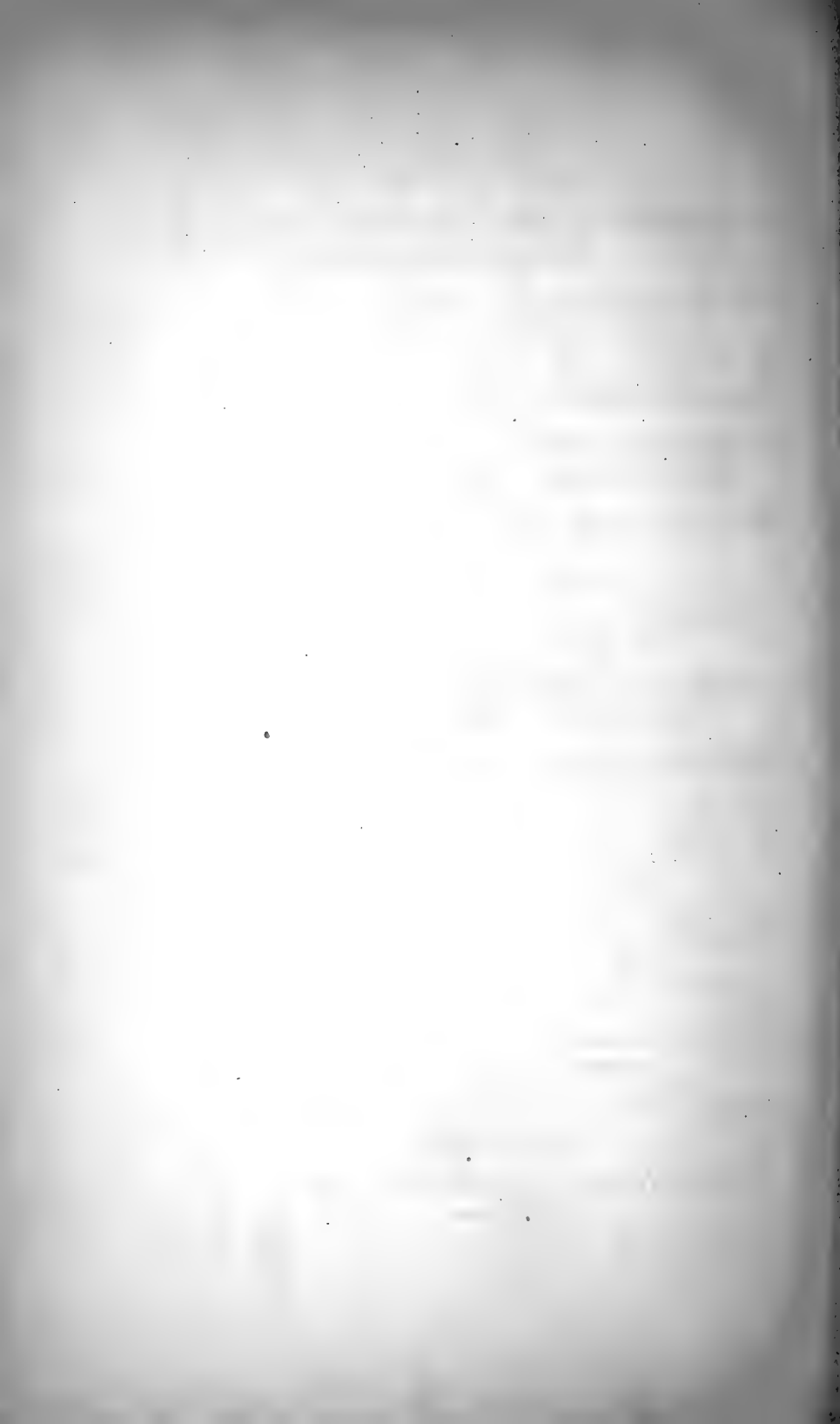
217. *ICTERUS BULLOCKII* (Sw.) Bp.  
**Bullock's Oriole.**

218. *ICTERUS CUCULLATUS* Sw.  
**Hooded Oriole.**

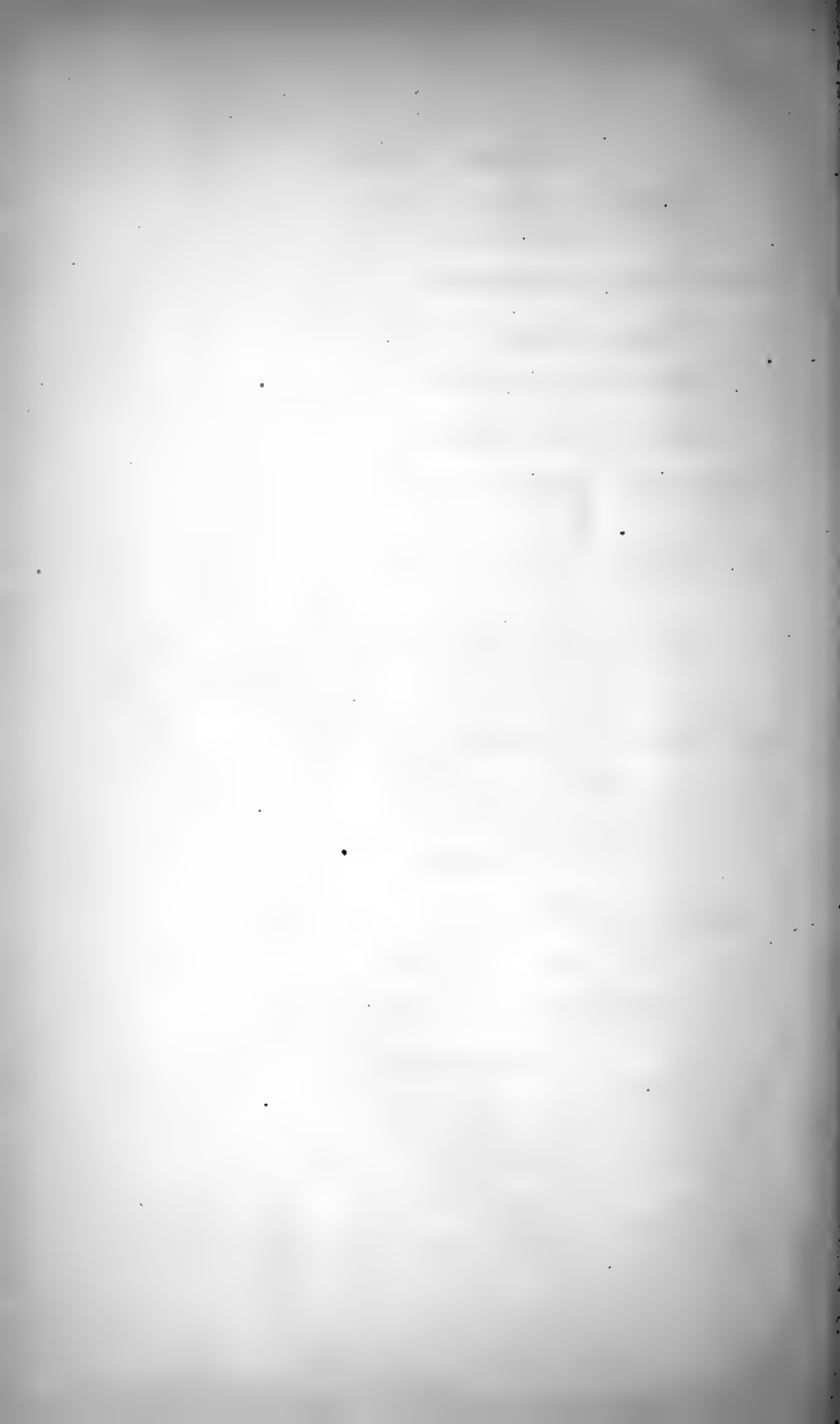
219. *ICTERUS PARISORUM* Bp.  
**Scott's Oriole.**

220. *ICTERUS MELANOCEPHALUS* (WAGL.) GR.,  
*var. AUDUBONII* (Girand.) Cs.  
**Audubon's Oriole.**

221. *SCOLECOPHAGUS FERRUGINEUS* (GM.) Sw.  
**Rusty Grackle.**



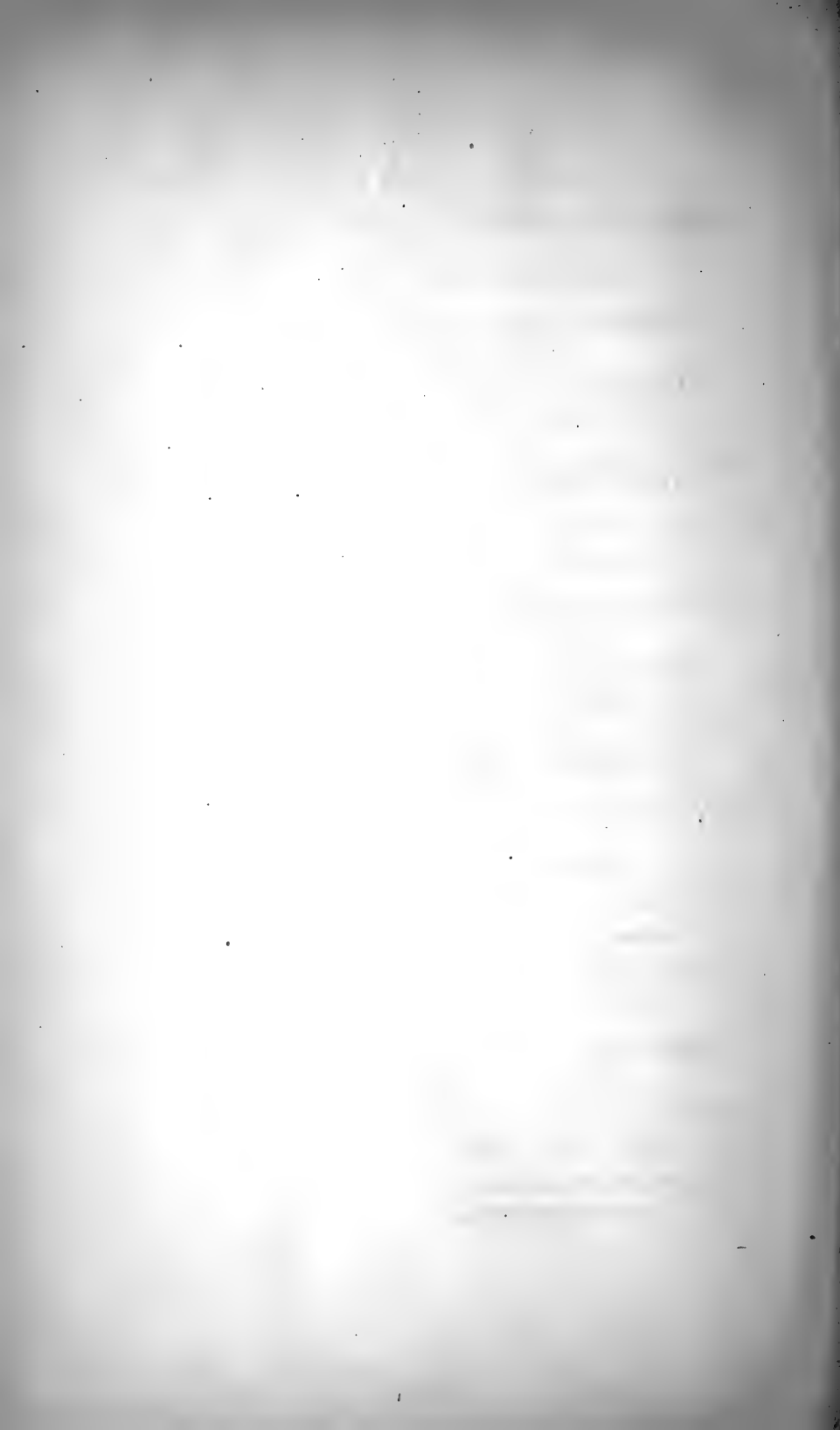
222. **SCOLECOPHAGUS CYANOCEPHALUS** (WAGL.) CAB.  
**Blue-headed Grackle.**
223. **QUISCALUS MACROURUS** SW.  
**Great-tailed Grackle.**
224. **QUISCALUS MAJOR** VIEIL.  
**Boat-tailed Grackle; Jackdaw.**
225. **QUISCALUS PURPUREUS** (BARTR.) LIGHT.  
**Purple Grackle; Crow Blackbird.**
- 225a. **QUISCALUS PURPUREUS** (BARTR.) LIGHT.,  
*var. AGLÆUS* (Bd.) Cs.  
**Florida Grackle.**
226. **CORVUS CORAX** LINN.  
**Raven.**
227. **CORVUS CRYPTOLEUCUS** COUCH.  
**White-necked Raven.**
228. **CORVUS AMERICANUS** AUD.  
**Common Crow.**
- 228a. **CORVUS AMERICANUS** AUD.,  
*var. FLORIDANUS* Bd.  
**Florida Crow.**
- 228b. **CORVUS AMERICANUS** AUD.,  
*var. CAURINUS* (Bd.) Cs.  
**Northwestern Fish Crow.**
229. **CORVUS OSSIFRAGUS** WILS.  
**Fish Crow.**
230. **PICICORVUS COLUMBIANUS** (WILS.) BP.  
**Clarke's Crow.**
231. **GYMNOKITTA CYANOCEPHALA** MAXIM.  
**Blue Crow.**



232. **PSILORHINUS MORIO** (WAGL.) GR.  
**Brown Jay.**
233. **PICA MELANOLEUCA** V.,  
*var. HUDSONICA* (Sab.) All.  
**American Magpie.**
- 233a. **PICA MELANOLEUCA** V.,  
*var. NUTTALLI* (Aud.) Cs.  
**Yellow-billed Magpie.**
234. **CYANURUS CRISTATUS** (L.) SW.  
**Blue Jay.**
235. **CYANURUS STELLERI** (GM.) SW.  
**Steller's Jay.**
- 235a. **CYANURUS STELLERI** (GM.) SW.,  
*var. MACROLOPHA* (Bd.) All.  
**Long-crested Jay.**
- 235b.\* **CYANURUS STELLERI** (GM.) SW.,  
*var. FRONTALIS* Ridg.  
**Blue-fronted Jay.**
236. **APHELOCOMA FLORIDANA** (BARTRAM) CAB.  
**Florida Jay.**
- 236a. **APHELOCOMA FLORIDANA** (BARTR.) CAB.,  
*var. WOODHOUSEI* (Bd.) All.  
**Woodhouse's Jay.**
- 236b. **APHELOCOMA FLORIDANA** (BARTR.) CAB.,  
*var. CALIFORNICA* (Vig.) Cs.  
**Californian Jay.**
237. **APHELOCOMA SORDIDA** (SW.) CAB.  
**Sieber's Jay.**

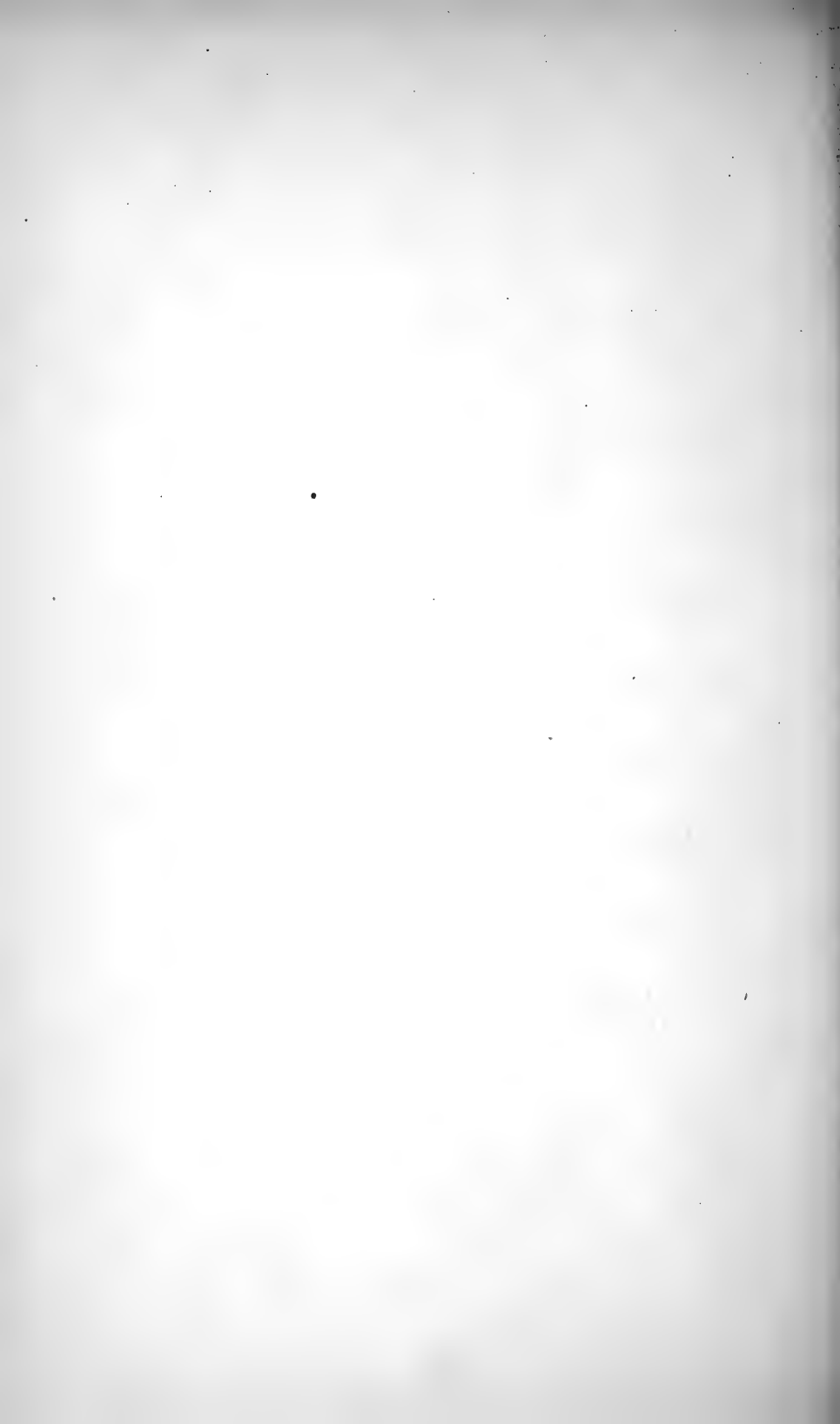
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\*Not in the Key. See Ridgway, Am. Journ., v, p. 43.





238. **XANTHOURA YNCAS** (BODD.) BP.,  
*var. LUXUOSA* (Less.) Cs.  
**Rio Grande Jay.**
239. **PERISOREUS CANADENSIS** (L.) BP.  
**Canada Jay.**
- [240.] **MILVULUS TYRANNUS** (L.) BP.  
**Fork-tailed Flycatcher.**
241. **MILVULUS FORFICATUS** (GM.) SW.  
**Swallow-tailed Flycatcher.**
242. **TYRANNUS CAROLINENSIS** (L.) BD.  
**Kingbird; Bee-martin.**
243. **TYRANNUS DOMINICENSIS** (GM.) RICH.  
**Gray Kingbird.**
244. **TYRANNUS VERTICALIS** SAY.  
**Arkansas Flycatcher.**
245. **TYRANNUS VOCIFERANS** SW.  
**Cassin's Flycatcher.**
- [246.] **TYRANNUS MELANCHOLICUS** V.,  
*var. COUCHII* (Bd.) Cs.  
**Couch's Flycatcher.**
247. **MYIARCHUS CRINITUS** (L.) CAB.  
**Great-crested Flycatcher.**
248. **MYIARCHUS CINERASCENS** LAWR.  
**Ash-throated Flycatcher.**
- [249.] **MYIARCHUS LAWRENCEI** (GIRAUD.) BD.  
**Lawrence's Flycatcher.**
250. **SAYORNIS SAYUS** (BP.) BD.  
**Say's Flycatcher.**
251. **SAYORNIS NIGRICANS** (SW.) BP.  
**Black Flycatcher.**



252. **SAYORNIS FUSCUS** (GM.) BD.  
**Pewee; Pewit; Phoebe.**
253. **CONTOPUS BOREALIS** (SW.) BD.  
**Olive-sided Flycatcher.**
254. **CONTOPUS PERTINAX** CAB.  
**Coues' Flycatcher.**
255. **CONTOPUS VIRENS** (L.) CAB.  
**Wood Pewee.**
- 255a. **CONTOPUS VIRENS** (L.) CAB.,  
*var. RICHARDSONII* (SW.) CS.,  
**Western Wood Pewee.**
256. **EMPIDONAX ACADICUS** (GM.) BD.  
**Acadian Flycatcher.**
257. **EMPIDONAX TRAILLII** (AUD.) BD.  
**Trail's Flycatcher.**
- 257a. **EMPIDONAX TRAILLII** (AUD.) BD.,  
*var. PUSILLUS* (Bd.) CS.  
**Little Western Flycatcher.**
258. **EMPIDONAX MINIMUS** BD.  
**Least Flycatcher.**
259. **EMPIDONAX FLAVIVENTRIS** BD.  
**Yellow-bellied Flycatcher.**
260. **EMPIDONAX HAMMONDII** BD.  
**Hammond's Flycatcher.**
261. **EMPIDONAX OBSCURUS** (SW.) BD.  
**Wright's Flycatcher.**
262. **MITREPHORUS FULVIFRONS** (GIRAUD.) SCL.,  
*var. PALLESCENS* CS.  
**Buff-breasted Flycatcher.**



263. **PYROCEPHALUS RUBINEUS** (Bodd.) Gr.,  
*var. MEXICANUS* (Scl.) Cs.  
**Vermilion Flycatcher.**
264. **ANTROSTOMUS CAROLINENSIS** (Gm.) Gould.  
**Chuck-will's-widow.**
265. **ANTROSTOMUS VOCIFERUS** (Wils.) Bp.  
**Whippoorwill; Night-jar.**
266. **ANTROSTOMUS NUTTALLII** (Aud.) Cass.  
**Nuttall's Whippoorwill.**
267. **CHORDEILES VIRGINIANUS** (Briss.) Bp.  
**Nighthawk.**
- 267a. **CHORDEILES VIRGINIANUS** (Briss.) Bp.,  
*var. HENRYI* (Cass.) All.  
**Western Nighthawk.**
268. **CHORDEILES TEXENSIS** Lawr.  
**Texas Nighthawk.**
269. **PANYPTILA SAXATILIS** (Woodh.) Cs.  
**White-throated Swift.**
270. **NEPHCECETES NIGER** (Gm.) Bd.,  
*var. BOREALIS* (Kennerly) Cs.  
**Black Swift.**
271. **CHÆTURA PELASGIA** (L.) Steph.  
**Chimney Swift.**
- 272? **CHÆTURA VAUXII** (Townsend) DeKay.  
**Vaux's Swift.**
273. **HELIOPÆDICA XANTUSII** Lawr.  
**Xantus Hummingbird.**
- [274.] **LAMPORNIS MANGO** (L.) Sw.,  
*(var. PORPHYRULA?)*  
**Black-throated Hummingbird.**



275. *TROCHILUS COLUBRIS* L.  
**Ruby-throated Hummingbird.**
276. *TROCHILUS ALEXANDRI* BOURC.  
**Black-chinned Hummingbird.**
277. *SELASPHORUS RUFUS* (GM.) SW.  
**Rufous-backed Hummingbird.**
278. *SELASPHORUS PLATYCERCUS* (SW.) GLD.  
**Broad-tailed Hummingbird.**
279. *SELASPHORUS ANNA* (LESS.)—  
**Anna Hummingbird.**
280. *SELASPHORUS COSTÆ* (BOURC.) BP.  
**Costa Hummingbird.**
281. *SELASPHORUS HELOISÆ* (—) —.  
**Heloise Hummingbird.**
282. *STELLULA CALLIOPE* (—) GLD.  
**Calliope Hummingbird.**
- [283]. *AGYRTIA LINNÆI* (BP.) —.  
**Linne Hummingbird.**
- [284]. *TROGON MEXICANUS* SW.  
**Mexican Trogon.**
- [285]. *MOMOTUS CÆRULEICEPS* GOULD.  
**Blue-headed Sawbill.**
286. *CERYLE ALCYON* (L.) BOIE.  
**Belted Kingfisher.**
287. *CERYLE AMERICANA* (GM.) BOIE,  
*var. CABANISI* (Reich.) Cs.  
**Cabanis' Kingfisher.**
288. *CROTOPHAGA ANI* L.  
**Ani.**
289. *GEOCOCCYX CALIFORNIANUS* (LESS.) BD.  
**Ground Cuckoo; Chaparral Cock.**





290. COCCYZUS ERYTHROPHthalmus (WILS.) BD.  
**Black-billed Cuckoo.**
291. COCCYZUS AMERICANUS (L.) BP.  
**Yellow-billed Cuckoo.**
292. COCCYZUS SENICULUS (LATH.)—  
**Mangrove Cuckoo.**
293. CAMPEPHILUS PRINCIPALIS (L.) GR.  
**Ivory-billed Woodpecker.**
294. HYLATOMUS PILEATUS (L.) BD.  
**Pileated Woodpecker; Logcock.**
295. PICUS ALBOLARVATUS (CASS.) BD.  
**White-headed Woodpecker.**
296. PICUS BOREALIS V.  
**Red-cockaded Woodpecker.**
297. PICUS SCALARIS WAGLER.  
**Texas Woodpecker.**
- 297a. PICUS SCALARIS WAGL.,  
*var. NUTTALLI* (Gamb.) Cs.  
**Nuttall's Woodpecker.**
- 297b. PICUS SCALARIS WAGL.,  
*var. LUCASANUS* (Xant.) Cs.  
**St. Lucas Woodpecker.**
298. PICUS VILLOSUS L.  
**Hairy Woodpecker.**
- 298a. PICUS VILLOSUS L.,  
*var. HARRISI* (Aud.) All.  
**Harris' Woodpecker.**
299. PICUS PUBESCENS L.  
**Downy Woodpecker.**



- 299a. **PICUS PUBESCENS** L.,  
*var. GAIRDNERII* (Aud.) Cs.  
**Gairdner's Woodpecker.**
300. **PICOIDES ARCTICUS** (Sw.) Gr.  
**Black-backed Woodpecker.**
301. **PICOIDES AMERICANUS** BREHM.  
**Banded-backed Woodpecker.**
- 301a. **PICOIDES AMERICANUS** BREHM.,  
*var. DORSALIS* (Bd.) All.  
**Striped-backed Woodpecker.**
302. **SPHYRAPICUS VARIUS** (L.) Bd.  
**Yellow-bellied Woodpecker.**
- 302a. **SPHYRAPICUS VARIUS** (L.) Bd.,  
*var. NUCHALIS* (Bd.) All.  
**Nuchal Woodpecker.**
- 303?\* **SPHYRAPICUS RUBER** (GM.) Bd.  
**Red-breasted Woodpecker.**
304. **SPHYRAPICUS THYROIDEUS** (CASS.) Bd.  
**Brown-headed Woodpecker.**
305. **SPHYRAPICUS WILLIAMSONI** (NEWB.) Bd.  
**Williamson's Woodpecker.**
306. **CENTURUS CAROLINUS** (L.) Bp.  
**Red-bellied Woodpecker.**
307. **CENTURUS AURIFRONS** (WAGL.).  
**Yellow-faced Woodpecker.**
308. **CENTURUS UROPYGIALIS** Bd.  
**Gila Woodpecker.**

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\* Apparently a var. of 302.



309. **MELANERPES ERYTHROCEPHALUS** (L.) SW.  
**Red-headed Woodpecker.**

310. **MELANERPES FORMICIVORUS** (SW.) BP.  
**Californian Woodpecker.**

310a. **MELANERPES FORMICIVORUS** (SW.) BP.,  
*var. ANGUSTIFRONS* BD.  
**Narrow-fronted Woodpecker.**

311. **ASYNDESMUS TORQUATUS** (WILS.) CS.  
**Lewis' Woodpecker.**

312. **COLAPTES AURATUS** (L.) SW.  
**Golden-winged Woodpecker; Flicker.**

313. **COLAPTES CHRYSOIDES** MALH.  
**Gilded Woodpecker.**

314. **COLAPTES MEXICANUS** SW.  
**Red-shafted Woodpecker.**

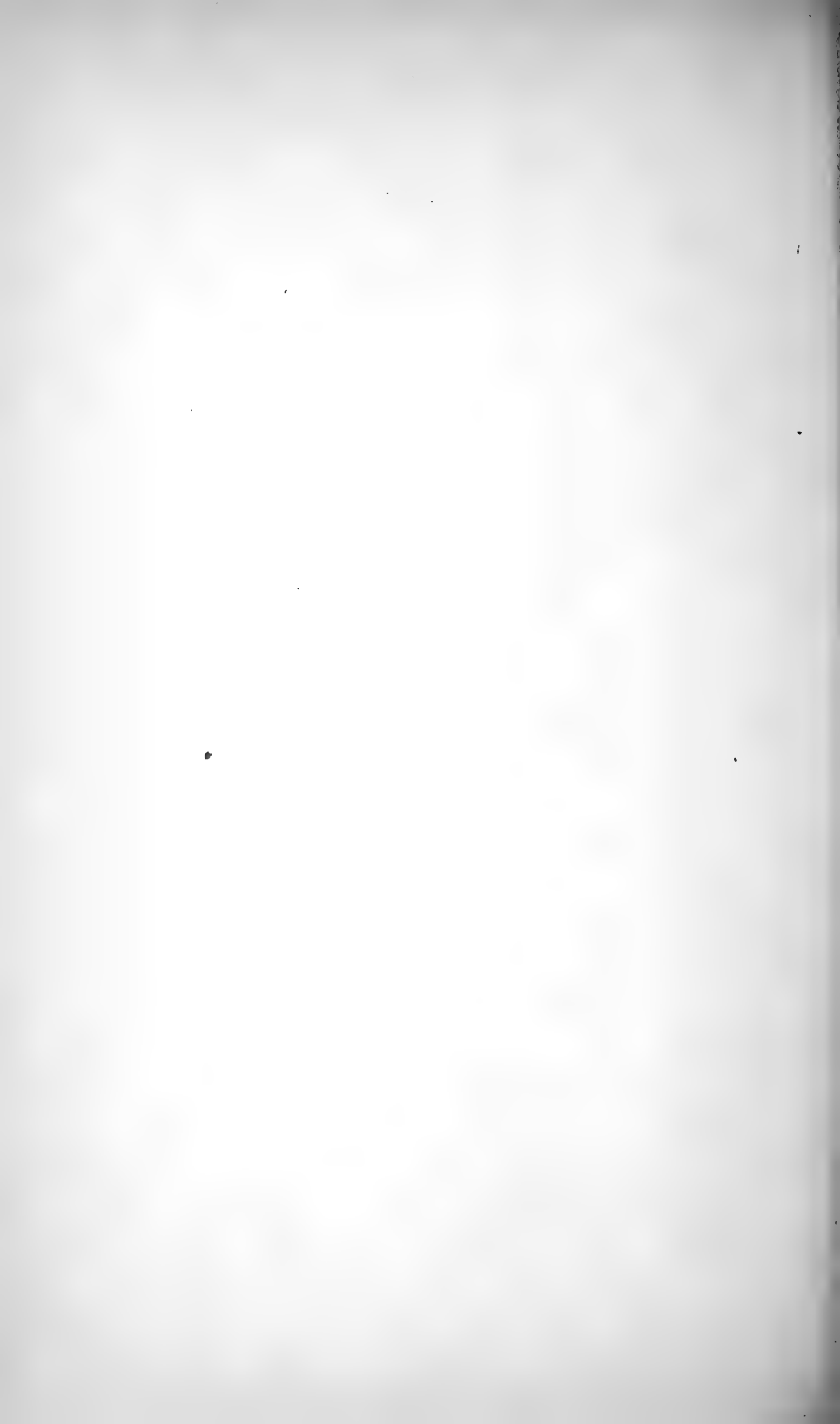
315. **CONURUS CAROLINENSIS** (L.) KUHLE.  
**Carolina Parroquet.**

316. **STRIX FLAMMEA** L.,  
*var. AMERICANA* (AUD.) CS.  
**Barn Owl.**

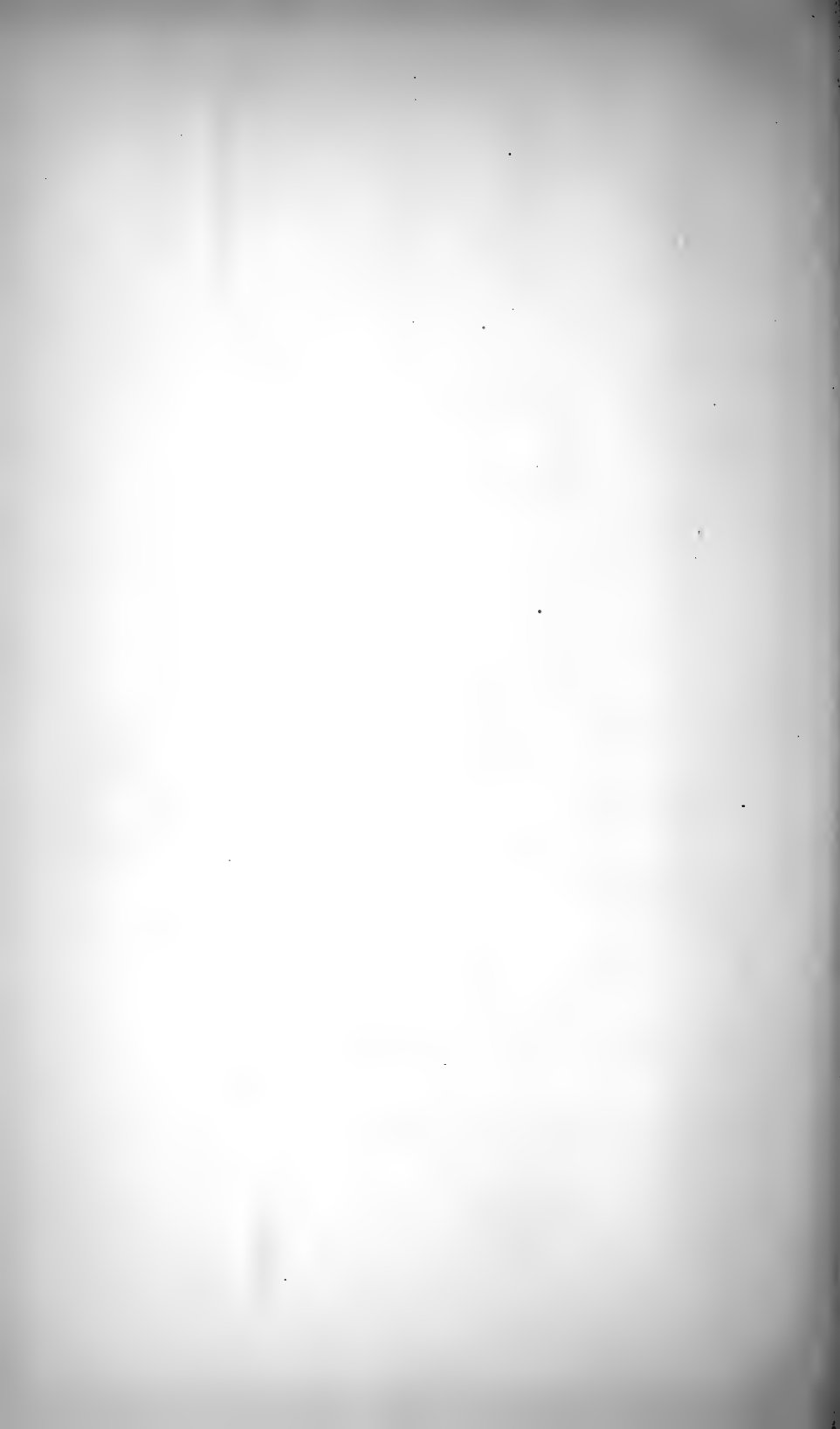
317. **BUBO VIRGINIANUS** (GM.) BP.  
**Great Horned Owl.**

317a. **BUBO VIRGINIANUS** (GM.) BP.,  
*var. ARCTICUS* (SW.) CASS.  
**Arctic Horned Owl.**

317b. **BUBO VIRGINIANUS** (GM.) BP.,  
*var. PACIFICUS* CASS.  
**Pacific Horned Owl.**



318. **SCOPS ASIO** (L.) BP.  
**Screech Owl; Mottled Owl.**
- 318a. **SCOPS ASIO** (L.) BP.,  
*var. KENNICOTHI* (Ell.) Cs.  
**Kennicott's Owl.**
- 318b. **SCOPS ASIO** (L.) BP.,  
*var. MACCALLII* (Cass.) Cs.  
**McCall's Owl.**
319. **SCOPS FLAMMEOLA** SCL.  
**Flammulated Owl.**
320. **OTUS VULGARIS** (L.),  
*var. WILSONIANUS* (Less.) All.  
**Long-eared Owl.**
321. **BRACHYOTUS PALUSTRIS** AUCT.  
**Short-eared Owl.**
322. **SYRNIUM LAPPONICUM** (L.),  
*var. CINEREUM* (Gm.) Ridg.  
**Great Gray Owl.**
323. **SYRNIUM NEBULOSUM** (FORST.) GR.  
**Barred Owl.**
324. **SYRNIUM OCCIDENTALE** XANT.  
**Western Barred Owl.**
325. **NYCTEA NIVEA** (DAUD.) GR.  
**Snowy Owl.**
326. **SURNIA ULULA** (L.) BP.,  
*var. HUDSONICA* (Gm.) Ridg.  
**Hawk Owl; Day Owl.**
327. **NYCTALE TENGMALMI** (GM.),  
*var. RICHARDSONII* (Bp.) Ridg.  
**Tengmalm's Owl.**





328. **NYCTALE ACADICA** (GM.) BP.  
**Acadian Owl; Saw-whet Owl.**
329. **GLAUCIDIUM PASSERINUM**,  
*var. CALIFORNICUM* (Scl.) Ridg.  
**Pygmy Owl.**
330. **GLAUCIDIUM FERRUGINEUM**.  
**Ferruginous Owl.**
331. **MICRATHENE WHITNEYI** (COOP.) CS.  
**Whitney's Owl.**
332. **SPEOTYTO CUNICULARIA** (MOL.),  
*var. HYPOGÆA* (Bp.) CS.  
**Burrowing Owl.**
333. **CIRCUS CYANEUS** (L.) LACÉP.,  
*var. HUDSONIUS* (L.) CS.  
**Marsh Hawk; Harrier.**
334. **ROSTRHAMUS SOCIABILIS** (V.) D'ORB.  
**Everglade Kite.**
335. **ICTINIA MISSISSIPPIENSIS** (WILS.) GR.  
**Mississippi Kite.**
336. **ELANUS LEUCURUS** (V.) BP.  
**White-tailed Kite; Black-shouldered Kite.**
337. **NAUCLERUS FURCATUS** (L.) VIG.  
**Swallow-tailed Kite.**
338. **ACCIPITER FUSCUS** (GM.) BP.  
**Sharp-shinned Hawk; Pigeon Hawk.**
339. **ACCIPITER COOPERI** BP.  
**Cooper's Hawk; Chicken Hawk.**
340. **ASTUR ATRICAPILLUS** (WILS.) BP.  
**Goshawk.**



341. **FALCO SACER** FORST.  
**Gyr Falcon; Jerfalcon.**
- 341a. **FALCO SACER** FORST.,  
*var. CANDICANS* (Gm.) Ridg.  
**Greenland Gyr Falcon.**
342. **FALCO MEXICANUS** LIGHT.  
**Lanier Falcon.**
343. **FALCO COMMUNIS VARIORUM.**  
**Peregrine Falcon; Duck Hawk.**
344. **FALCO COLUMBARIUS** L.  
**Pigeon Hawk.**
345. **FALCO RICHARDSONII** RIDG.  
**Richardson's Falcon.**
346. **FALCO SPARVERIUS** L.  
**Sparrow Hawk.**
- 346a. **FALCO SPARVERIUS** L.,  
*var. ISABELLINUS* (Sw.) Ridg.  
**Isabella Sparrow Hawk.**
347. **FALCO FEMORALIS** TEMM.  
**Femoral Falcon.**
348. **BUTEO UNICINCTUS** (TEMM.) GR.,  
*var. HARRISI* (Aud.) Ridg.  
**Harris' Buzzard.**
- 349? **BUTEO COOPERI** CASS.  
**Cooper's Buzzard.**
- 350? **BUTEO HARLANI** (AUD.) BP.  
**Harlan's Buzzard.**
351. **BUTEO BOREALIS** (GM.) V.  
**Red-tailed Buzzard; Hen Hawk.**



- 351a. **BUTEO BOREALIS** (GM.) V.,  
*var. CALURUS* (Cass.) Ridg.  
**Western Red-tailed Buzzard.**
- 351b. **BUTEO BOREALIS** (GM.) V.,  
*var. LUCASANUS* Ridg.  
**St. Lucas Buzzard.**
- 351c.\* **BUTEO BOREALIS** (GM.) V.,  
*var. KRIDERI*.  
**Krider's Buzzard.**
352. **BUTEO LINEATUS** (GM.) JARD.  
**Red-shouldered Buzzard.**
- 352a. **BUTEO LINEATUS** (GM.) JARD.,  
*var. ELEGANS* (Cass.) Ridg.  
**Western Red-shouldered Buzzard.**
353. **BUTEO ZONOCERCUS** SCL.  
**Band-tailed Hawk.**
354. **BUTEO SWAINSONI** BP.  
**Swainson's Buzzard.**
355. **BUTEO PENNSYLVANICUS** (WILS.) BP.  
**Broad-winged Buzzard.**
356. **ARCHIBUTEO LAGOPUS** (BRUNN.) GR.,  
*var. SANCTI-JOHANNIS* (Gm.) Ridg.  
**Rough-legged Buzzard.**
357. **ARCHIBUTEO FERRUGINEUS** (LICHT.) GR.  
**Ferruginous Buzzard.**
358. **ASTURINA PLAGIATA** SCHLEGEL.  
**Gray Hawk.**
- 359.† **ONYCHOTES GRUBERI** RIDG.  
**Gruber's Buzzard.**

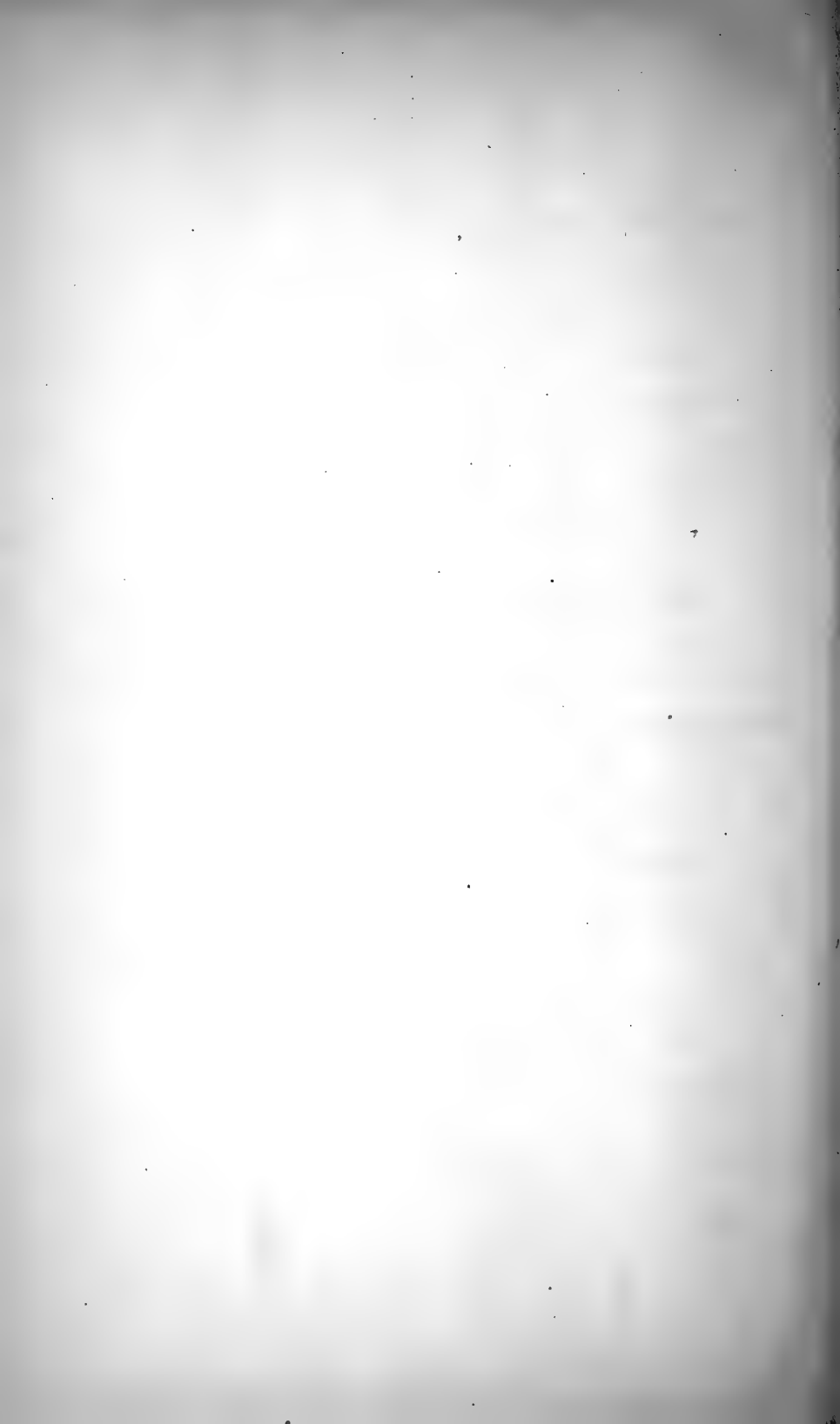
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\* 351c. Not in Key; not published at date of going to press.

† 359. Questionably North American.



360. **PANDION HALIAETUS** (L.) SAVIGNY.  
**Fish Hawk; Osprey.**
361. **AQUILA CHRYSÆTUS** (L.).  
**Golden Eagle.**
362. **HALIAETUS LEUCOCEPHALUS** (L.) SAVIGNY.  
**White-headed Eagle; Bald Eagle.**
363. **POLYBORUS THARUS** (MOLL.) CASS.,  
*var. AUDUBONII* (Cass.) RIDG.  
**Audubon's Caracara.**
364. **CATHARTES CALIFORNIANUS** (SHAW) CUV.  
**Californian Vulture.**
365. **CATHARTES AURA** (L.) ILLIGER.  
**Turkey Buzzard.**
366. **CATHARTES ATRATUS** (BARTR.) LESS.  
**Black Vulture; Carrion Crow.**
367. **COLUMBA FASCIATA** SAY.  
**Band-tailed Pigeon.**
368. **COLUMBA FLAVIROSTRIS** WAGLER.  
**Red-billed Pigeon.**
369. **COLUMBA LEUCOCEPHALA** L.  
**White-crowned Pigeon.**
370. **ECTOPISTES MIGRATORIUS** (L.) SW.  
**Wild Pigeon.**
371. **ZENÆDURA CAROLINENSIS** (L.) BP.  
**Carolina Dove.**
372. **ZENÆDA AMABILIS** BP.  
**Zenaida Dove.**
373. **MELOPELEIA LEUCOPTERA** (L.) BP.  
**White-winged Dove.**





374. **CHAMÆPELEIA PASSERINA** (L.) SW.  
**Ground Dove.**
- 374a. **CHAMÆPELEIA PASSERINA** (L.) SW.,  
*var. PALLESCENS* (Bd.) Cs.  
**St. Lucas Ground Dove.**
375. **SCARDAFELLA SQUAMOSA** (TEMM.) BP.,  
*var. INCA* (Less.) Cs.  
**Scaled Dove.**
376. **GEOTRYGON MARTINICA** (GM.) REICH.  
**Key West Dove.**
377. **STARNCENAS CYANOCEPHALA** (L.) BP.  
**Blue-headed Ground Dove.**
378. **ORTALIDA VETULA** (WAGL.).  
**Texan Guan.**
379. **MELEAGRIS GALLOPAVO** L.  
**Turkey.**
- 379a. **MELEAGRIS GALLOPAVO** L.,  
*var. AMERICANA* (Bartr.) Cs.  
**Common Wild Turkey.**
380. **TETRAO CANADENSIS** L.  
**Canada Grouse; Spruce Partridge.**
- 380a. **TETRAO CANADENSIS** L.,  
*var. FRANKLINI* (Douglas) Cs.  
**Franklin's Grouse.**
381. **TETRAO OBSCURUS** SAY.  
**Dusky Grouse.**
- 381a. **TETRAO OBSCURUS** SAY,  
*var. RICHARDSONII* (Dougl.) Cs.  
**Richardson's Grouse.**



382. **CENTROCERCUS UROPHASIANUS** (BP.) SW.  
**Sage Cock; Cock-of-the-Plains.**

383. **PEDICECETES PHASIANELLUS** (L.) ELL.  
**Northern Sharp-tailed Grouse.**

383a. **PEDICECETES PHASIANELLUS** (L.) ELL.,  
*var. COLUMBIANUS* (Ord.) Cs.  
**Common Sharp-tailed Grouse.**

384. **CUPIDONIA CUPIDO** (L.) BD.  
**Pinnated Grouse; Prairie Hen.**

385. **BONASA UMBELLUS** (L.) STEPH.  
**Ruffed Grouse; Partridge; Pheasant.**

385a. **BONASA UMBELLUS** (L.) STEPH.,  
*var. UMBELLOIDES* (Dougl.) Bd.  
**Gray Ruffed Grouse.**

385b. **BONASA UMBELLUS** (L.) STEPH.,  
*var. SABINEI* (Dougl.) Cs.  
**Oregon Ruffed Grouse.**

386. **LAGOPUS ALBUS** (GM.) AUD.  
**Willow Ptarmigan.**

387. **LAGOPUS RUPESTRIS** (GM.) LEACH.  
**Rock Ptarmigan.**

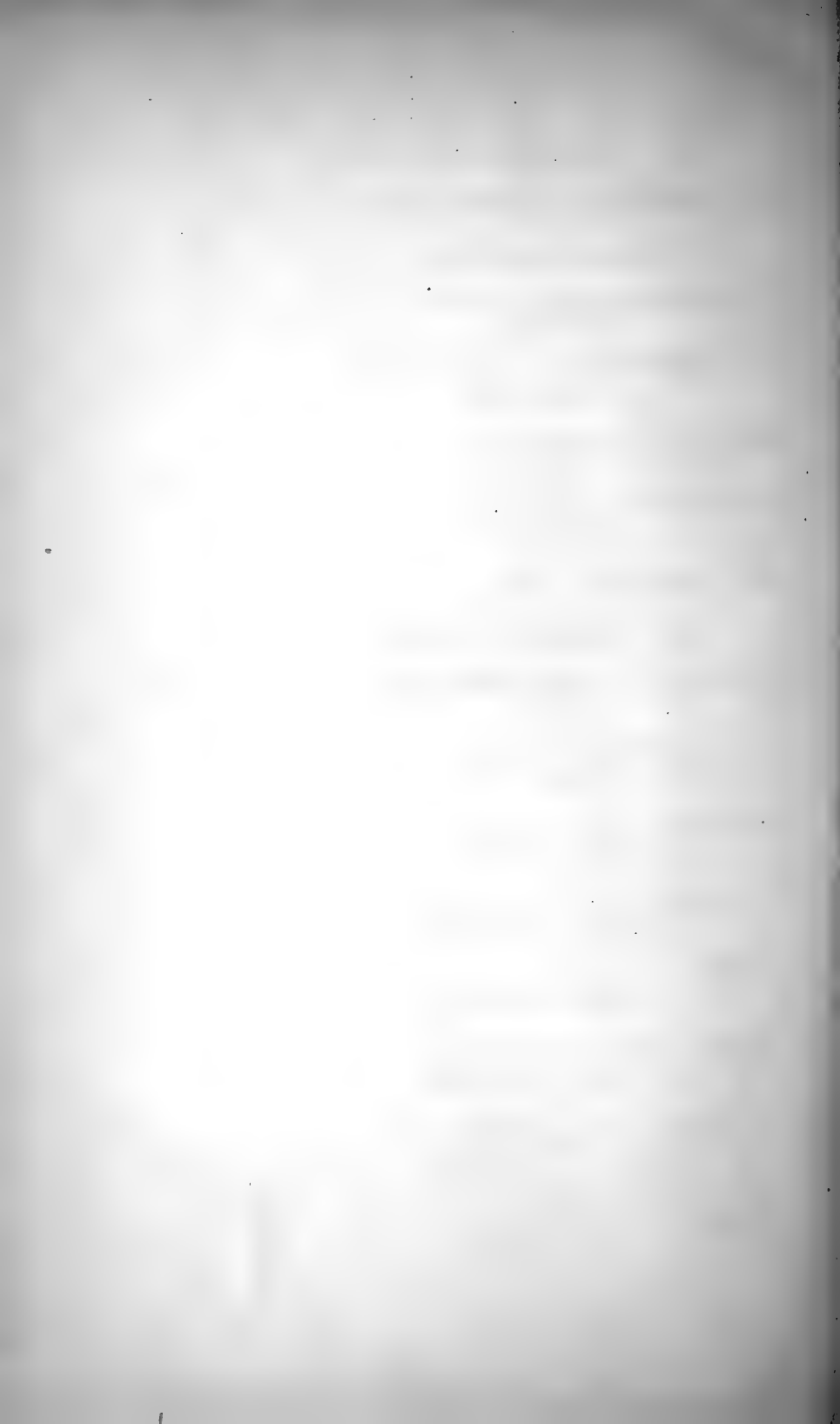
388. **LAGOPUS LEUCURUS** SW.  
**White-tailed Ptarmigan.**

389. **ORTYX VIRGINIANUS** (L.) BP.  
**Virginia Partridge; Quail; Bob-white.**

389a. **ORTYX VIRGINIANUS** (L.) BP.,  
*var. FLORIDANUS* Cs.  
**Florida Partridge.**



- 389b. **ORTYX VIRGINIANUS** (L.) BP.,  
*var. TEXANUS* (Lawr.) Cs.  
**Texan Partridge.**
390. **OREORTYX PICTUS** (DOUGL.) BD.  
**Plumed Partridge.**
391. **LOPHORTYX CALIFORNICUS** (SHAW) BP.  
**Californian Partridge.**
392. **LOPHORTYX GAMBELI** NUTT.  
**Gambel's Partridge.**
393. **CALLIPEPLA SQUAMATA** (VIG.) GR.  
**Scaled Partridge.**
394. **CYRTONYX MASSENA** (LESS.) GLD.  
**Massena Partridge.**
395. **SQUATAROLA HELVETICA** (L.) CUV.  
**Black-bellied Plover.**
396. **CHARADRIUS FULVUS** GM.,  
*var. VIRGINICUS* (Borck.) Cs.  
**Golden Plover.**
397. **ÆGIALITIS VOCIFERUS** (L.) CASS.  
**Kildeer Plover.**
398. **ÆGIALITIS WILSONIUS** (ORD) CASS.  
**Wilson's Plover.**
399. **ÆGIALITIS SEMIPALMATUS** (BP.) CAB.  
**Semipalmated Plover; Ringneck.**
400. **ÆGIALITIS MELODUS** (ORD) CAB.  
**Piping Plover; Ringneck.**
401. **ÆGIALITIS CANTIANUS** (Lath.).  
**snowy Plover.**



- 402.\* *ÆGIALITIS ASIATICUS* (PALL.),  
*var. MONTANUS* (TOWNS.) CS.  
**Mountain Plover.**
403. *APHRIZA VIRGATA* (GM.) GR.  
**Surf Bird.**
404. *HÆMATOPUS PALLIATUS* TEMM.  
**Oyster-catcher.**
405. *HÆMATOPUS NIGER* PALLAS.  
**Black Oyster-catcher.**
406. *STREPSILAS INTERPRES* (L.) ILL.  
**Turnstone.**
- 406a. *STREPSILAS INTERPRES* (L.) ILL.,  
*var. MELANOCEPHALUS* (VIG.) CS.  
**Black-headed Turnstone.**
407. *RECURVIROSTRA AMERICANA* GM.  
**Avocet.**
408. *HIMANTOPUS NIGRICOLLIS* V.  
**Stilt.**
409. *STEGANOPUS WILSONI* (SAB.) CS.  
**Wilson's Phalarope.**
410. *LOBIPES HYPERBOREUS* (L.) CUV.  
**Northern Phalarope.**
411. *PHALAROPUS FULICARIUS* (L.) BP.  
**Red Phalarope.**
412. *PHILOHELA MINOR* (GM.) GR.  
**American Woodcock.**
- [413.] *SCOLOPAX RUSTICOLA* L.  
**European Woodcock.**

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\* May require to stand as *Eudromias montanus* (Towns.) Harting.





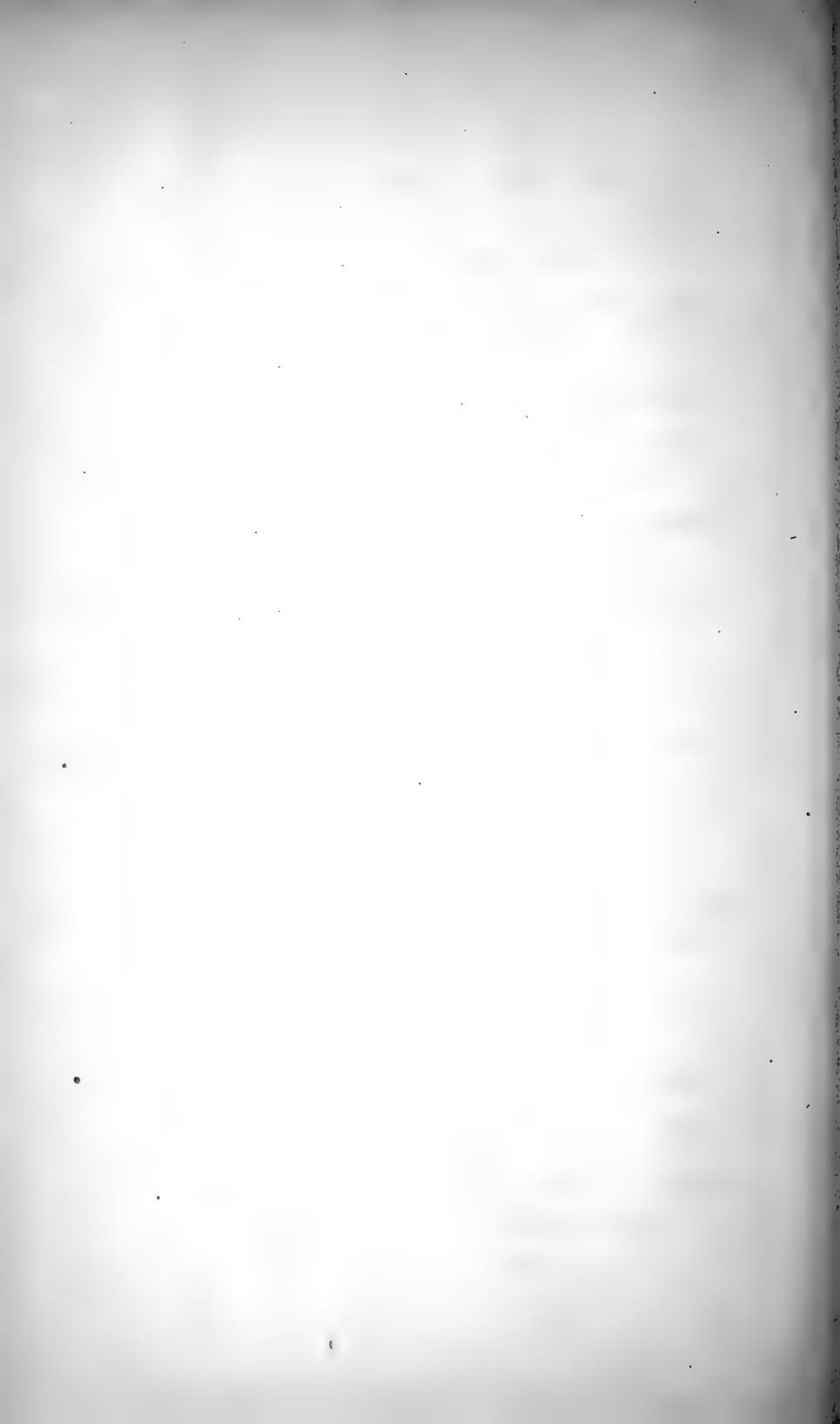
414. GALLINAGO WILSONI (TEMM.) BP.  
**American Snipe; Wilson's Snipe.**
415. MACRORHAMPHUS GRISEUS (GM.) LEACH.  
**Red-breasted Snipe.**
- 415a. MACRORHAMPHUS GRISEUS (GM.) LEACH,  
*var. SCOLOPACEUS* (Say) Cs.  
**Long-billed Snipe.**
416. MICROPALAMA HIMANTOPUS (BP.) BD.  
**Stilt Sandpiper.**
417. EREUNETES PUSILLUS (L.) CASS.  
**Semipalmated Sandpiper.**
- 417a. EREUNETES PUSILLUS (L.) CASS.,  
*var. OCCIDENTALIS* (LAWR.) Cs.  
**Western Semipalmated Sandpiper.**
418. TRINGA MINUTILLA V.  
**Least Sandpiper.**
419. TRINGA BAIRDII COUES.  
**Baird's Sandpiper.**
420. TRINGA MACULATA V.  
**Pectoral Sandpiper.**
421. TRINGA BONAPARTEI SCHL.  
**White-rumped Sandpiper.**
- 422? TRINGA COOPERI BD.  
**Cooper's Sandpiper.**
423. TRINGA MARITIMA BRUNNICH.  
**Purple Sandpiper.**
424. TRINGA ALPINA L.,  
*var. AMERICANA* Cass.  
**American Dunlin.**



425. TRINGA SUBARQUATA GULD.  
**Curlew Sandpiper.**
426. TRINGA CANUTUS L.  
**Red-breasted Sandpiper; Knot.**
- 426bis.\* TRINGA CRASSIROSTRIS SCHLEGEL.  
**Thick-billed Sandpiper.**
427. CALIDRIS ARENARIA (L.) ILL.  
**Sanderling; Ruddy Plover.**
428. LIMOSA FEDOA (L.) ORD.  
**Great Marbled Godwit.**
429. LIMOSA HUDSONICA (LATH.) SW.  
**Hudsonian Godwit.**
430. LIMOSA UROPYGIALIS GOULD.  
**White-rumped Godwit.**
431. TOTANUS SEMIPALMATUS GM.  
**Semipalmated Tattler; Willet.**
432. TOTANUS MELANOLEUCUS GM.  
**Greater Tell-tale.**
433. TOTANUS FLAVIPES GM.  
**Yellow-shanks.**
- [434.] TOTANUS CHLOROPUS NILSSON.  
**Green-shanks.**
435. TOTANUS SOLITARIUS WILS.  
**Solitary Tattler.**
436. TRINGOIDES MACULARIUS (L.) GR.  
**Spotted Sandpiper.**

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\*Not in the Key. Obtained at St. Paul's Island, by H. W. Elliot. Identified by J. E. Harting. See DALL, Am. Nat., vii, Oct., 1873, p. 634.



- [437.] PHILOMACHUS PUGNAX (L.) GR.  
**Ruff; Reeve.**
438. ACTITURUS BARTRAMIUS (WILS.) BP.  
**Bartramian Sandpiper; Upland Plover.**
439. TRYNGITES RUFESCENS (V.) CAB.  
**Buff-breasted Sandpiper.**
440. HETEROSCELUS INCANUS (GM.) CS.  
**Wandering Tattler.**
441. NUMENIUS LONGIROSTRIS WILS.  
**Long-billed Curlew.**
442. NUMENIUS HUDSONICUS LATH.  
**Hudsonian Curlew.**
443. NUMENIUS BOREALIS (FORST.) LATH.  
**Esquimaux Curlew.**
444. TANTALUS LOCULATOR L.  
**Wood Ibis.**
445. IBIS FALCINELLUS AUCT.,  
*var. ORDII* (BP.) ALL.  
**Glossy Ibis.**
446. IBIS ALBA (L.) V.  
**White Ibis.**
- [447.] IBIS RUBRA (L.) V.  
**Scarlet Ibis.**
448. PLATALEA AJAJA L.  
**Roseate Spoonbill.**
449. ARDEA HERODIAS L.  
**Great Blue Heron.**
- 450? ARDEA WURDEMANNI BD.  
**Florida Heron.**



451. *ARDEA OCCIDENTALIS* AUD.  
**Great White Heron.**
452. *ARDEA EGRETTA* GM.  
**Great White Egret.**
453. *ARDEA CANDIDISSIMA* JACQUIN.  
**Little White Egret.**
454. *ARDEA LEUCOGASTRA* GM.,  
*var. LEUCOPRYMNA* (Licht.) Cs.  
**Louisiana Heron.**
455. *ARDEA RUFUS* BODD.  
**Reddish Egret.**
456. *ARDEA CÆRULEA* L.  
**Little Blue Heron.**
457. *ARDEA VIRESCENS* L.  
**Green Heron.**
458. *NYCTIARDEA GRISEA* (L.) STEPH.,  
*var. NÆVIA* (Bodd.) Allen.  
**Night Heron.**
459. *NYCTIARDEA VIOLACEA* (L.) SW.  
**Yellow-crowned Night Heron.**
460. *BOTAURUS MINOR* (GM.).  
**Bittern; Indian Hen.**
461. *ARDETTA EXILIS* (GM.) GR.  
**Least Bittern.**
462. *GRUS AMERICANUS* (L.) ORD.  
**White Crane; Whooping Crane.**
463. *GRUS CANADENSIS* (L.) TEMM.  
**Brown Crane; Sandhill Crane.**

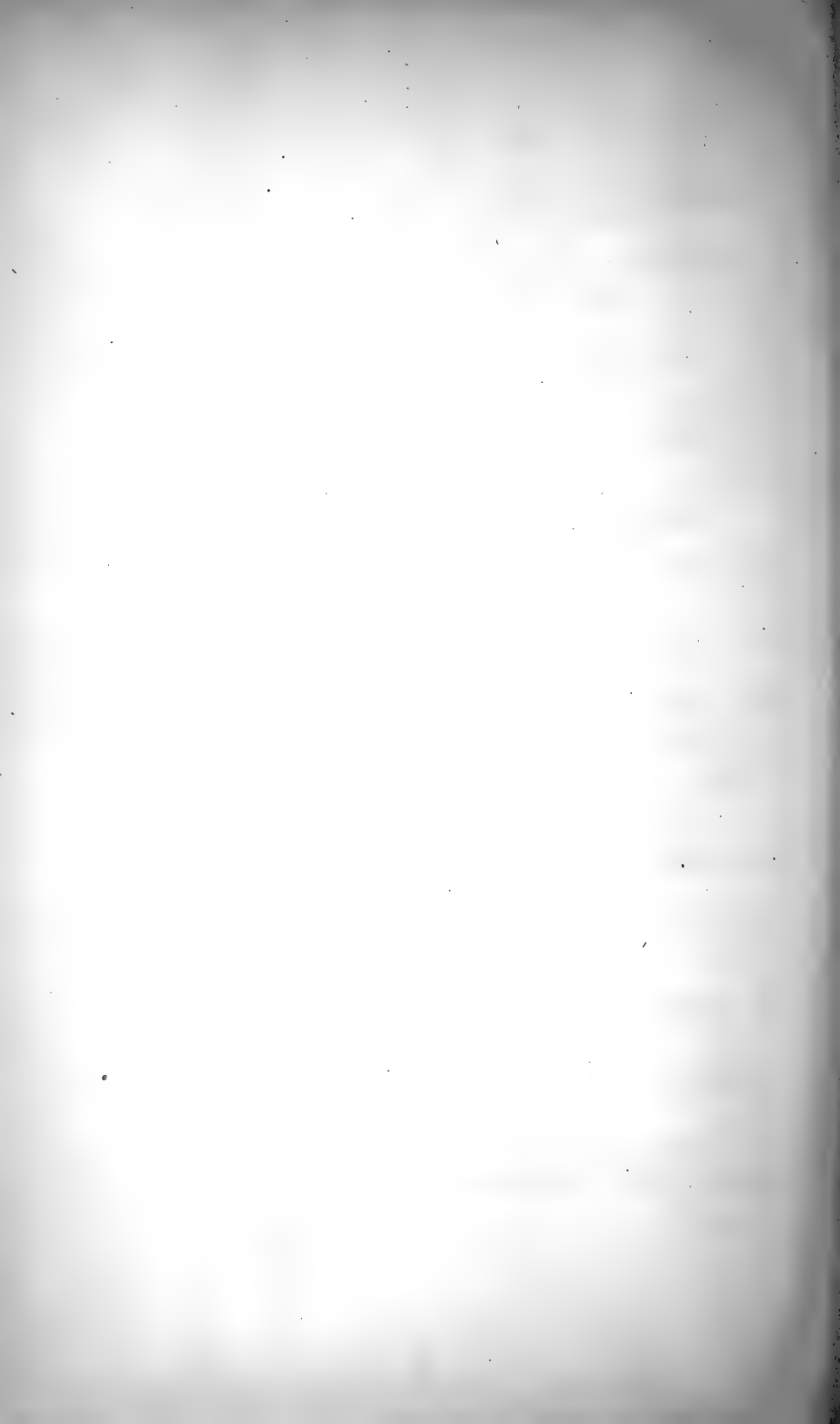




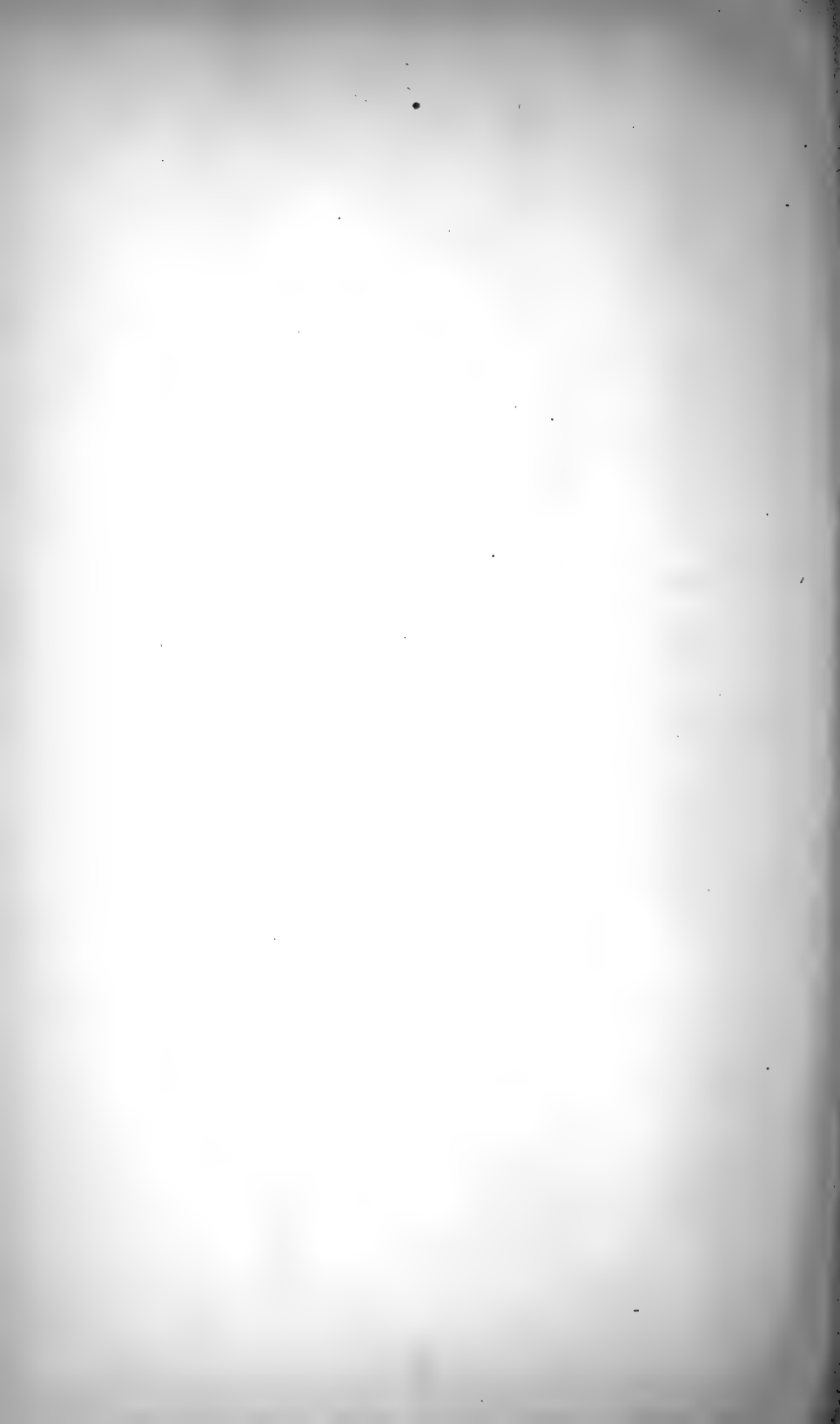
464. **ARAMUS SCOLOPACEUS** (GM.) V.,  
*var. GIGANTEUS* (Bp.) Cs.  
**Scolopaceous Courlan.**
465. **RALLUS LONGIROSTRIS** BODD.  
**Clapper Rail; Salt-water Marsh Hen.**
466. **RALLUS ELEGANS** AUD.  
**Fresh-water Marsh Hen.**
467. **RALLUS VIRGINIANUS** L.  
**Virginia Rail.**
468. **PORZANA CAROLINA** (L.) V.  
**Carolina Rail; Sora; Ortolan.**
469. **PORZANA NOVEBORACENSIS** (GM.) CASS.  
**Yellow Rail.**
470. **PORZANA JAMAICENSIS** (GM.) CASS.  
**Black Rail.**
- [471.] **CREX PRATENSIS** BECHSTEIN.  
**Corn Crane.**
472. **GALLINULA GALEATA** (LICHT.) BP.,  
*(CHLOROPUS var?)*.  
**Florida Gallinule.**
473. **PORPHYRIO MARTINICA** (L.) TEMM.  
**Purple Gallinule.**
474. **FULICA AMERICANA** GM.  
**Coot.**
475. **PHENICOPTERUS RUBER** L.  
**Flamingo.**
476. **CYGNUS BUCCINATOR** RICHARDSON.  
**Trumpeter Swan.**



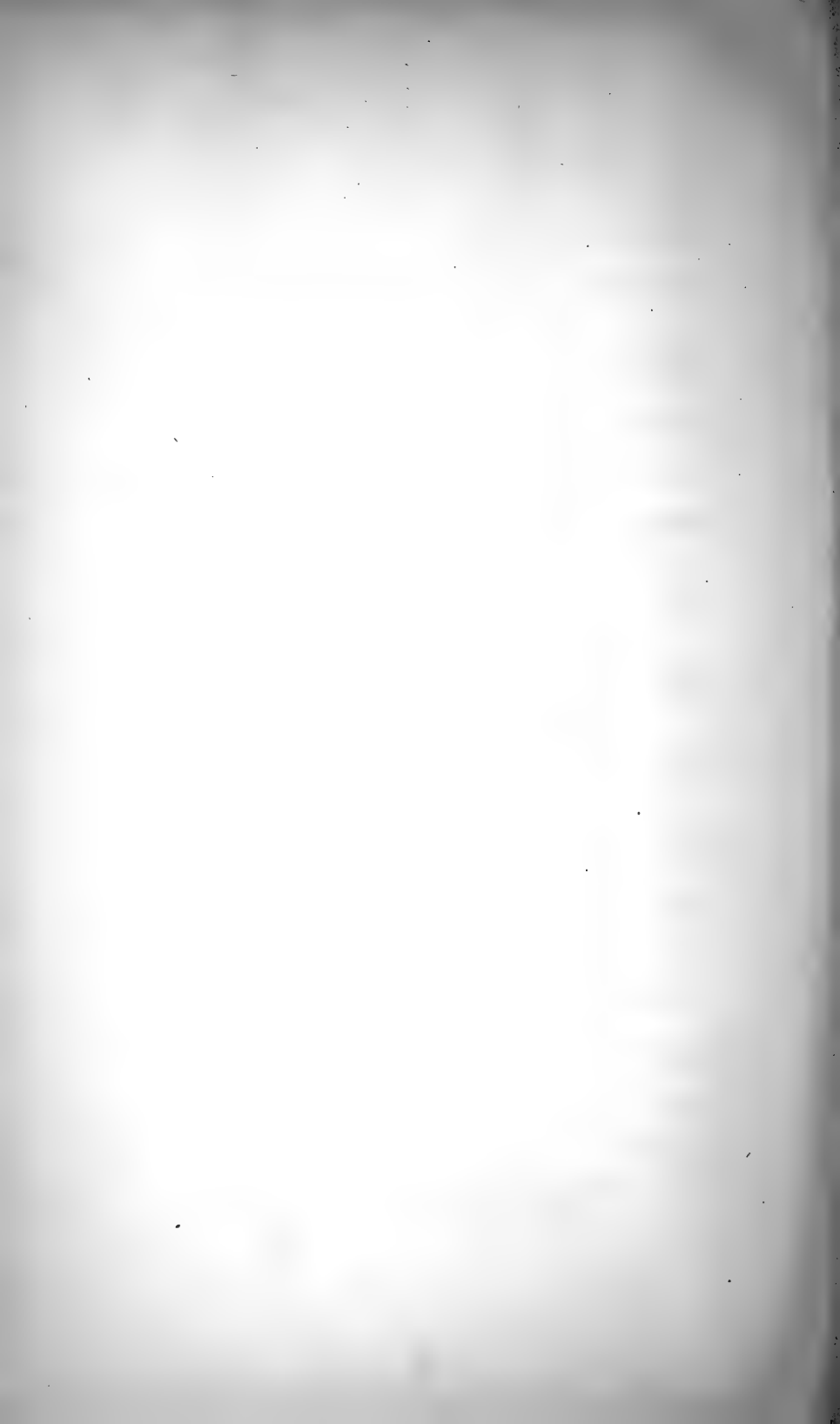
477. *CYGNUS AMERICANUS* SHARPLESS.**Whistling Swan.**478. *ANSER ALBIFRONS* GM.,*var. GAMBELI* (Hartl.) Cs.**American White-fronted Goose.**479? *ANSER CÆRULESCENS* L.**Blue Goose.**480. *ANSER HYPERBOREUS* PALL.**Snow Goose.**480a. *ANSER HYPERBOREUS* PALL.,*var. ALBATUS* (Cass.) Cs.**Lesser Snow Goose.**481. *ANSER ROSSII* BD.**Ross' Goose.**482. *PHILACTE CANAGICA* (SEVAST.) BANN.**Painted Goose.**[483.] *BRANTA LEUCOPSIS* (L.).**Barnacle Goose.**484. *BRANTA BERNICLA* (L.).**Brant Goose.**485. *BRANTA CANADENSIS* (L.).**Canada Goose; Wild Goose.**485a. *BRANTA CANADENSIS* (L.),*var. LEUCOPAREIA* (Brandt) Cs.**White-collared Goose.**485b. *BRANTA CANADENSIS* (L.),*var. HUTCHINSII* (Rich.) Cs.**Hutchins' Goose.**



486. *DENDROCYGNA FULVA* (GM.) BURM.  
**Fulvous Tree Duck.**
487. *DENDROCYGNA AUTUMNALIS* (L.) EYTON.  
**Autumnal Tree Duck.**
488. *ANAS BOSCHAS* L.  
**Mallard.**
489. *ANAS OBSCURA* GM.  
**Dusky Duck.**
490. *DAFILA ACUTA* (L.) JENYNS.  
**Pintail; Sprigtail.**
491. *CHAULELASMUS STREPERUS* (L.) GRAY.  
**Gadwall; Gray Duck.**
- [492.] *MARECA PENELOPE* (L.) BP.  
**European Widgeon.**
- 493? *MARECA AMERICANA* (GM.) STEPH.  
**American Widgeon; Baldpate.**
- [494.] *QUERQUEDULA CRECCA* (L.) STEPH.  
**English Teal.**
495. *QUERQUEDULA CAROLINENSIS* (GM.).  
**Green-winged Teal.**
496. *QUERQUEDULA DISCORS* (L.) STEPH.  
**Blue-winged Teal.**
497. *QUERQUEDULA CYANOPTERA* (V.) CASS.  
**Cinnamon Teal.**
498. *SPATULA CLYPEATA* (L.) BOIE.  
**Shoveller.**
499. *AIX SPONSA* (L.) BOIE.  
**Summer Duck; Wood Duck.**

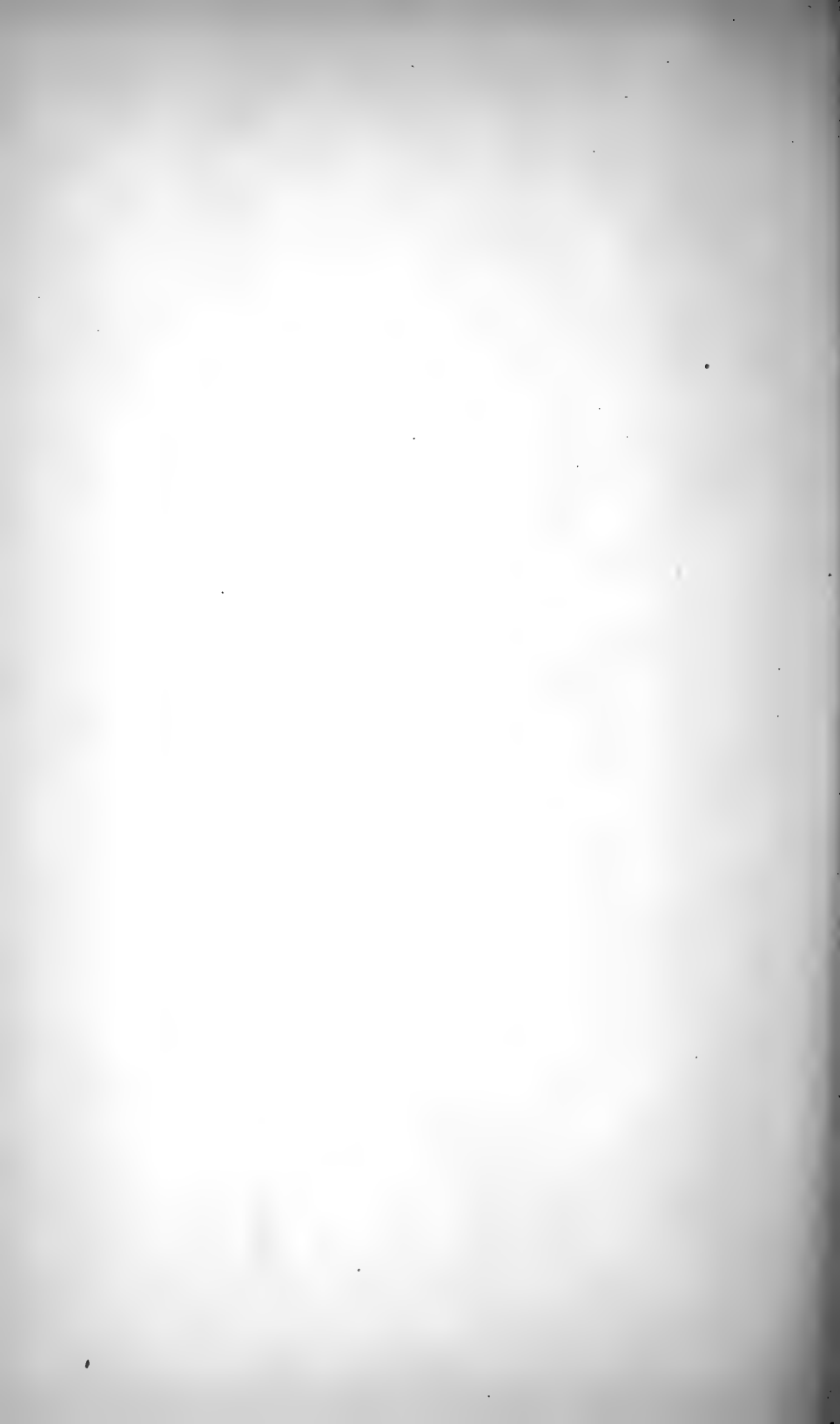


500. *FULIGULA MARILA* (L.) STEPH.  
**Greater Blackhead.**
- 501? *FULIGULA AFFINIS* EYTON.  
**Lesser Blackhead.**
502. *FULIGULA COLLARIS* (DONOVAN) BP.  
**Ring-necked Duck.**
503. *FULIGULA FERINA* (L.) SW.,  
*var. AMERICANA* (EYTON) COUES.  
**Redhead; Pochard.**
504. *FULIGULA VALLISNERIA* (WILS.) STEPH.  
**Canvas-back.**
505. *BUCEPHALA CLANGULA* (L.) GR.  
**Golden-eyed Duck.**
506. *BUCEPHALA ISLANDICA* (GM.) BD.  
**Barrow's Golden-eye.**
507. *BUCEPHALA ALBEOLA* (L.) BD.  
**Buffle-headed Duck.**
508. *HARELDA GLACIALIS* (L.) LEACH.  
**Long-tailed Duck.**
509. *CAMPTOLÆMUS LABRADORIUS* (GM.) GR.  
**Labrador Duck.**
510. *HISTRIONICUS TORQUATUS* (L.) BP.  
**Harlequin Duck.**
511. *SOMATERIA STELLERI* (PALL.) JARDINE.  
**Steller's Duck.**
512. *SOMATERIA FISCHERI* (BRANDT) COUES.  
**Spectacled Eider.**
513. *SOMATERIA MOLLISSIMA* (L.) LEACH.  
**Eider Duck.**

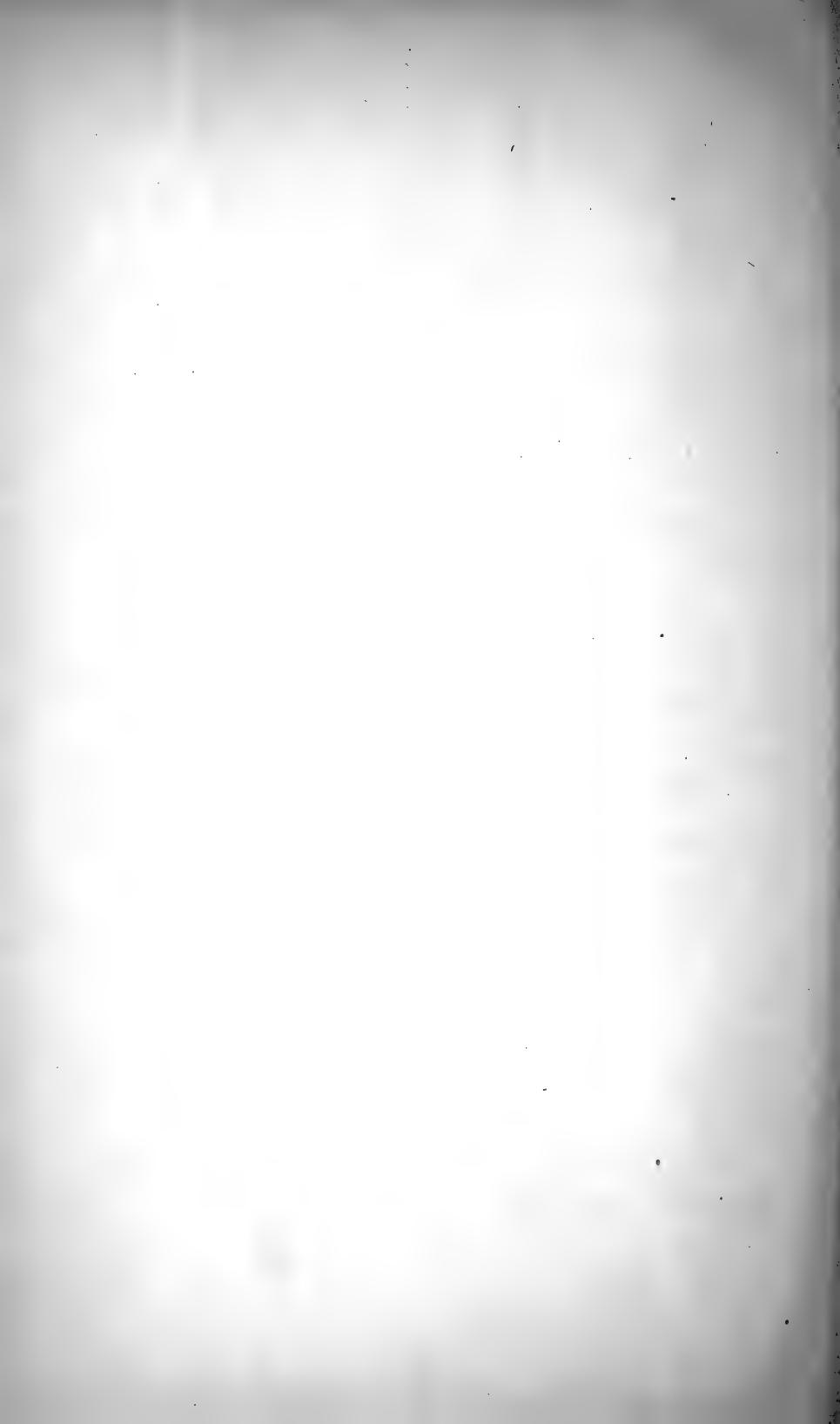




- 514? SOMATERIA V-NIGRA GRAY.  
**Pacific Eider.**
515. SOMATERIA SPECTABILIS (L.) LEACH.  
**King Eider.**
516. CEDEMIA AMERICANA SW.  
**American Black Scoter.**
517. CEDEMIA FUSCA (L.) SW.,  
(? var. VELVETINA Cass.)  
**Velvet Scoter.**
518. CEDEMIA PERSPICILLATA (L.) FLEMING.  
**Surf Duck.**
- 518a. CEDEMIA PERSPICILLATA (L.) FLEMING,  
var. TROWBRIDGEI (Bd.) COUES.  
**Long-billed Scoter.**
519. ERISMATURA RUBIDA (WILS.) BP.  
**Ruddy Duck.**
- [520.] ERISMATURA DOMINICA (L.) EYTON.  
**St. Domingo Duck.**
521. MERGUS MERGANSER L.  
**Merganser; Goosander.**
522. MERGUS SERRATOR L.  
**Red-breasted Merganser.**
523. MERGUS CUCULLATUS L.  
**Hooded Merganser.**
524. SULA BASSANA L.  
**Gannet; Solan Goose.**
525. SULA FIBER L.  
**Booby Gannet.**
526. PELECANUS TRACHYRHYNCHUS LATH.  
**White Pelican.**



527. PELECANUS FUSCUS L.  
**Brown Pelican.**
528. GRACULUS CARBO (L.) GRAY.  
**Common Cormorant; Shag.**
529. GRACULUS CINCINNATUS (BRANDT) GRAY.  
**White-tufted Cormorant.**
530. GRACULUS DILOPHUS (SW.) GRAY.  
**Double-crested Cormorant.**
- 530a. GRACULUS DILOPHUS (SW.) GRAY,  
*var. FLORIDANUS* (AUD.) COUES.  
**Florida Cormorant.**
531. GRACULUS MEXICANUS (BRANDT) BP.  
**Mexican Cormorant.**
532. GRACULUS PENICILLATUS (BRANDT) BP.  
**Brandt's Cormorant.**
533. GRACULUS PERSPICILLATUS (PALL.) LAWR.  
**Pallas' Cormorant.**
534. GRACULUS BICRISTATUS (PALL.) BD.  
**Red-faced Cormorant.**
535. GRACULUS VIOLACEUS (GM.) GR.  
**Violet-green Cormorant.**
536. PLOTUS ANHINGA L.  
**Anhinga; Darter.**
537. TACHYPETES AQUILUS (L.) V.  
**Frigate.**
538. PHAETHON FLAVIROSTRIS BRANDT.  
**Yellow-billed Tropic Bird.**
539. STERCORARIUS SKUA (BRUNN.) COUES.  
**Skua Gull.**



540. STERCORARIUS POMATORHINUS (TEMM.) LAWR.

**Pomarine Jaeger.**

541. STERCORARIUS PARASITICUS (BRUNN.) GRAY.

**Richardson's Jaeger.**

542. STERCORARIUS BUFFONI (BOIE) COUES.

**Arctic Jaeger; Long-tailed Jaeger.**

543. LARUS GLAUCUS BRUNN.

**Glaucous Gull.**

544. LARUS LEUCOPTERUS FABER.

**White-winged Gull.**

545. LARUS GLAUCESCENS LIGHT.

**Glaucous-winged Gull.**

546. LARUS MARINUS L.

**Great Black-backed Gull.**

547. LARUS ARGENTATUS BRUNN.

**Herring Gull; Common Gull.**

547a. LARUS ARGENTATUS BRUNN.,

*var.* SMITHSONIANUS COUES.

**American Herring Gull.**

547b. LARUS ARGENTATUS BRUNN.,

*var.* OCCIDENTALIS (AUD.) COUES.

**Western Herring Gull.**

548. LARUS DELAWARENSIS ORD.

**Ring-billed Gull.**

548a. LARUS DELAWARENSIS ORD,

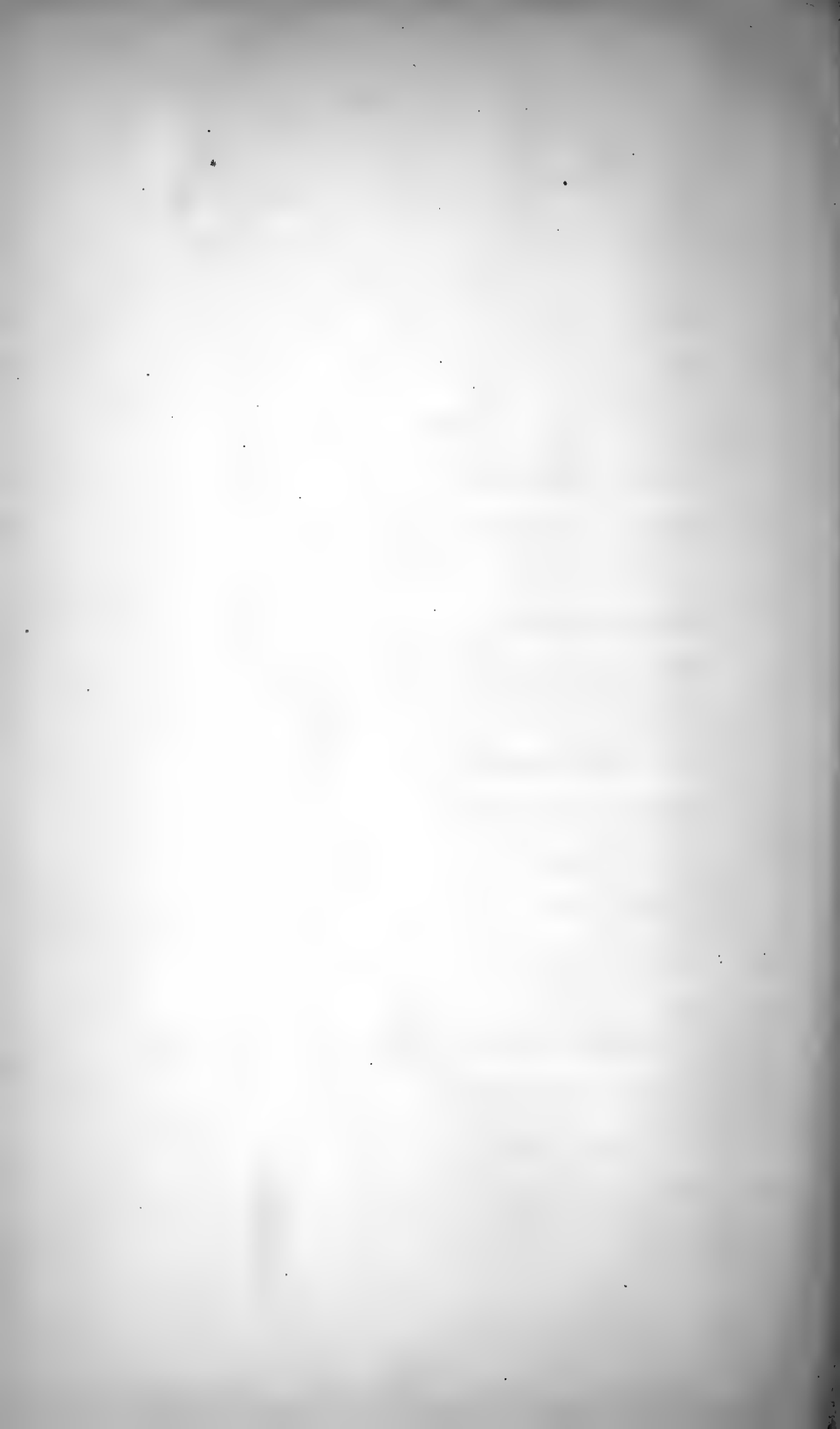
*var.* CALIFORNICUS (LAWR.) COUES.

**Californian Gull.**

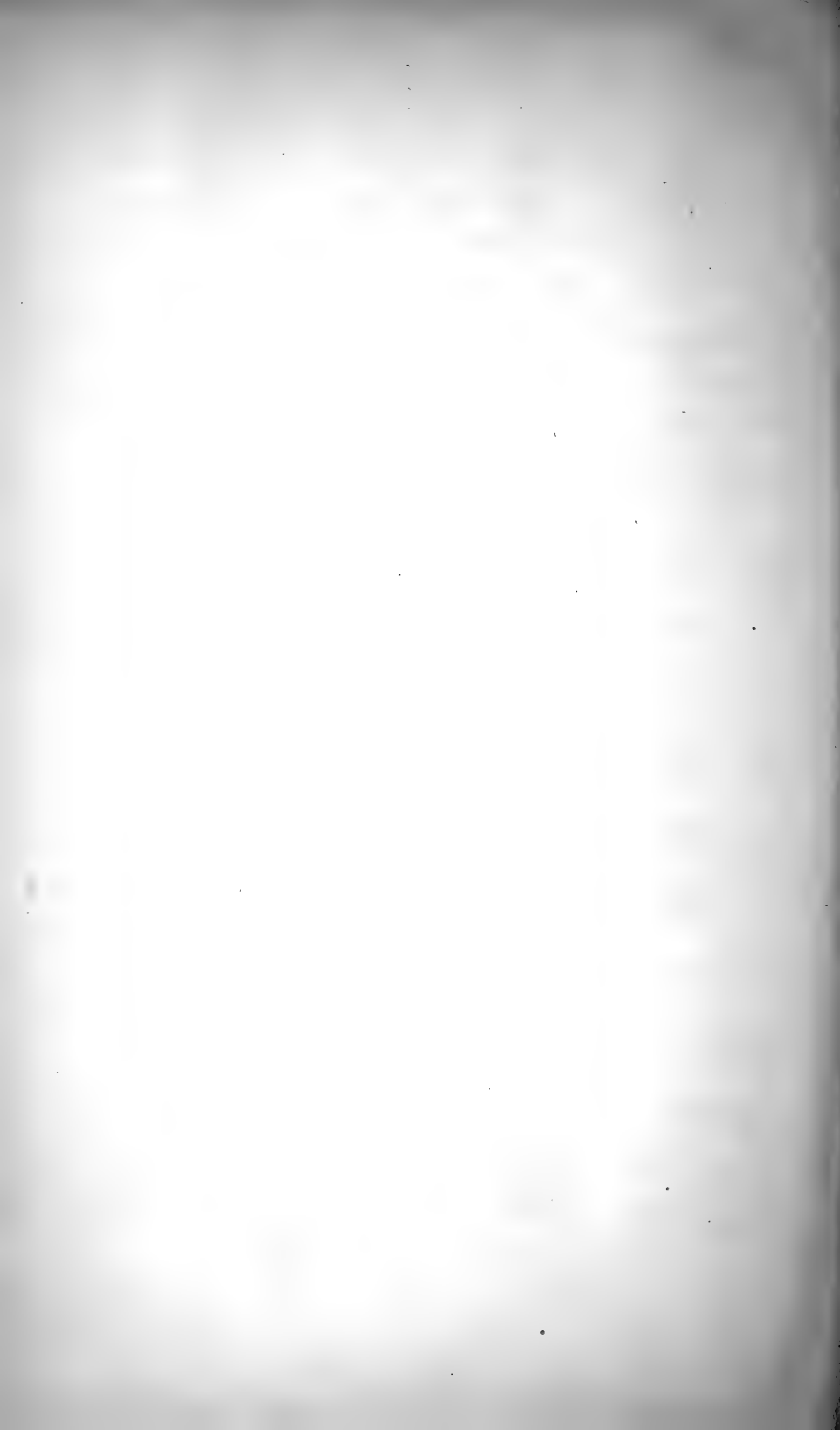
549. LARUS CANUS L.,

*var.* BRACHYRHYNCHUS (RICH.) COUES.

**American Mew Gull.**



550. **LARUS EBURNEUS** GM.  
**Ivory Gull.**
551. **LARUS BELCHERI** VIGORS.  
**White-headed Gull**
552. **LARUS TRIDACTYLUS** L.  
**Kittiwake Gull.**
- 552a. **LARUS TRIDACTYLUS** L.,  
*var. KOTZEBUI* (Bp.) COUES.  
**Pacific Kittiwake.**
553. **LARUS BREVIROSTRIS** (BRANDT) COUES.  
**Short-billed Kittiwake.**
554. **LARUS ATRICILLA** L.  
**Laughing Gull.**
555. **LARUS FRANKLINI** RICH.  
**Franklin's Rosy Gull.**
556. **LARUS PHILADELPHIA** (ORD) COUES.  
**Bonaparte's Gull.**
557. **RHODOSTETHIA ROSEA** (MAGGILL.) BP.  
**Wedge-tailed Gull.**
558. **XEMA SABINEI** (SAB.) BP.  
**Fork-tailed Gull.**
559. **XEMA FURCATUM** (NEBOUX).  
**Swallow-tailed Gull.**
560. **STERNA ANGLICA** MONTAGU.  
**Gull-billed Tern; Marsh Tern.**
561. **STERNA CASPIA** PALLAS,  
*var. IMPERATOR* COUES.  
**Caspian Tern.**
562. **STERNA REGIA** GAMBEL.  
**Royal Tern.**

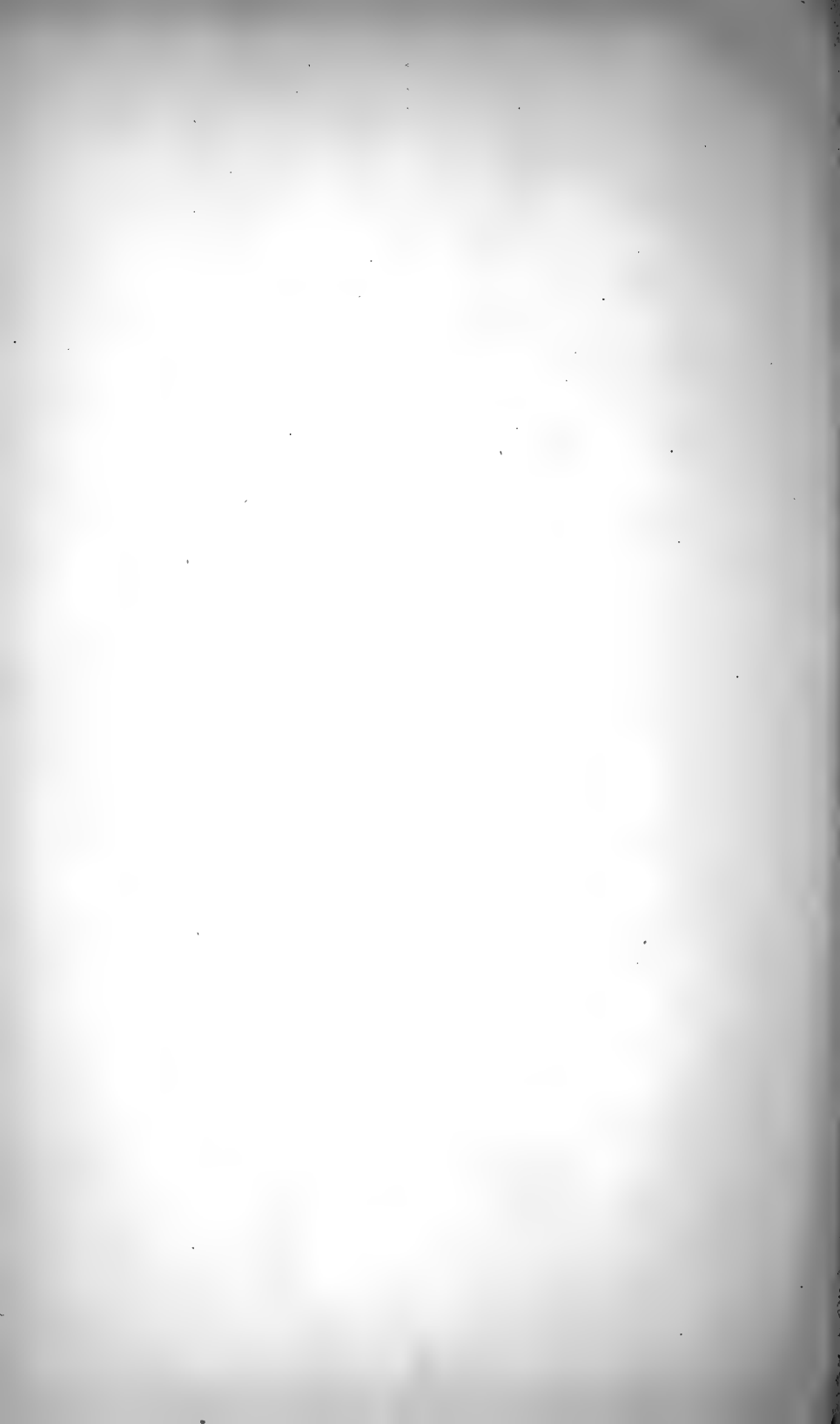




563. STERNA GALERICULATA LIGHT.  
**Elegant Tern.**
564. STERNA CANTIACA GM.  
**Sandwich Tern.**
565. STERNA HIRUNDO L.  
**Common Tern; Sea Swallow.**
566. STERNA FORSTERI NUTT.  
**Forster's Tern.**
567. STERNA MACROURA NAUMANN.  
**Arctic Tern.**
568. STERNA LONGIPENNIS NORDMANN.  
**Pike's Tern.**
569. STERNA PARADISÆA BRUNN.  
**Roseate Tern.**
570. STERNA SUPERCILIARIS V.  
**Least Tern.**
- [571.] STERNA TRUDEAUI AUD.  
**Trudeau's Tern.**
572. STERNA ALEUTICA BAIRD.  
**Aleutian Tern.**
573. STERNA FULIGINOSA GM.  
**Sooty Tern.**
- [574.] STERNA ANOSTHÆTA SCOPOLI.  
**Bridled Tern.**
575. HYDROCHELIDON FISSIPES (L.) GRAY.  
**Black Tern.**
576. ANOUS STOLIDUS (L.) LEACH.  
**Noddy Tern.**
577. RHYNCHOPS NIGRA L.  
**Black Skimmer.**



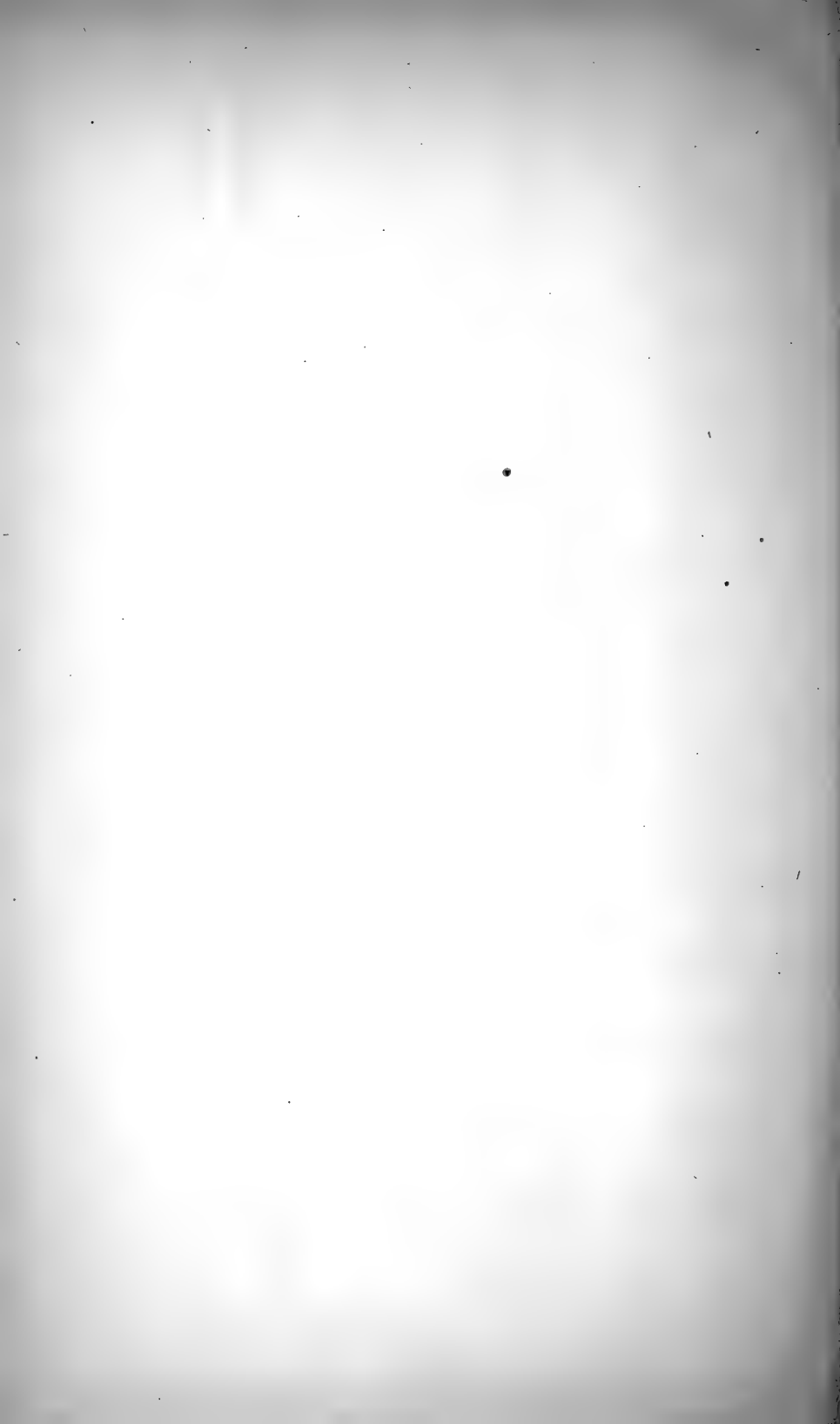
578. DIOMEDEA BRACHYURA TEMM.  
**Short-tailed Albatross.**
579. DIOMEDEA NIGRIPES AUD.  
**Black-footed Albatross.**
580. DIOMEDEA FULIGINOSA GM.  
**Sooty Albatross.**
581. FULMAREUS GIGANTEUS (GM.).  
**Giant Fulmar.**
582. FULMAREUS GLACIALIS (L.) STEPH.  
**Fulmar Petrel.**
- 582a. FULMAREUS GLACIALIS (L.) STEPH.,  
*var. PACIFICUS (Aud.) Coues.*  
**Pacific Fulmar.**
- 582b. FULMAREUS GLACIALIS (L.) STEPH.,  
*var. RODGERSI (Cass.) Coues.*  
**Rodgers' Fulmar.**
- [583.] FULMAREUS TENUIROSTRIS (AUD.) COUES.  
**Slender-billed Fulmar.**
- [584.] DAPTION CAPENSIS (L.) STEPH.  
**Pintado Petrel; Cape Pigeon.**
- [585.] ÆSTRELATA HÆSITATA (KUHLE) COUES.  
**Black-capped Petrel.**
586. HALOCYPTENA MICROSOMA COUES.  
**Wedge-tailed Petrel; Least Petrel.**
587. PROCELLARIA PELAGICA L.  
**Stormy Petrel; Mother Carey's Chicken.**
588. CYMOCHOREA LEUCORRHOEA (V.) COUES.  
**Leach's Petrel.**
589. CYMOCHOREA MELANIA (BP.) COUES.  
**Black Petrel.**



590. CYMOCHOREA HOMOCHROA COUES.  
**Ashy Petrel.**
591. OCEANODROMA FURCATA (GM.) BP.  
**Fork-tailed Petrel.**
592. OCEANODROMA HORNBYI (GRAY) BP.  
**Hornby's Petrel.**
593. OCEANITES OCEANICA (KÜHL) COUES.  
**Wilson's Petrel.**
- [594.] FREGETTA GRALLARIA (V.) BP.  
**White-bellied Petrel.**
- [595.] PUFFINUS MELANURUS (BONN.) COUES.  
**Black-tailed Shearwater.**
596. PUFFINUS KUHLII BP.  
**Cinereous Shearwater.**
597. PUFFINUS MAJOR FABER.  
**Greater Shearwater.**
- 598? PUFFINUS CREATOPUS COUES.  
**Flesh-footed Shearwater.**
599. PUFFINUS ANGLORUM TEMM.  
**Manks Shearwater.**
600. PUFFINUS OBSCURUS (GM.) LATH.  
**Dusky Shearwater.**
- 601? PUFFINUS OPISTHOMELAS COUES.  
**Black-vented Shearwater.**
- 602? PUFFINUS FULIGINOSUS STRICKL.  
**Sooty Shearwater.**
- 603? PUFFINUS AMAUROSOMA COUES.  
**Dark-bodied Shearwater.**
604. PUFFINUS TENUIROSTRIS TEMM.  
**Slender-billed Shearwater.**



605. **COLYMBUS TORQUATUS** BRUNN.  
**Loon; Great Northern Diver.**
- 605a. **COLYMBUS TORQUATUS** BRUNN.,  
*var. ADAMSHI* (Gray) Coues.  
**Yellow-billed Loon.**
606. **COLYMBUS ARCTICUS** L.  
**Black-throated Diver.**
- 606a. **COLYMBUS ARCTICUS** L.,  
*var. PACIFICUS* (Lawr.) Coues.  
**Pacific Diver.**
607. **COLYMBUS SEPTENTRIONALIS** L.  
**Red-throated Diver.**
608. **PODICEPS OCCIDENTALIS** LAWR.  
**Western Grebe.**
- 608a. **PODICEPS OCCIDENTALIS** LAWR.,  
*var. CLARKII* (Lawr.) Coues.  
**Clarke's Grebe.**
609. **PODICEPS CRISTATUS** (L.) LATH.  
**Crested Grebe.**
610. **PODICEPS GRISEIGENA** (BODD.) GRAY,  
*var. HOLBÖLLI* (Reinh.) Coues.  
**Red-necked Grebe.**
611. **PODICEPS CORNUTUS** (GM.) LATH.  
**Horned Grebe.**
612. **PODICEPS AURITUS** (L.) LATH.,  
*var. CALIFORNICUS* (Heerm.) Coues.  
**American Eared Grebe.**
613. **PODICEPS DOMINICUS** (L.)  
**St. Domingo Grebe.**

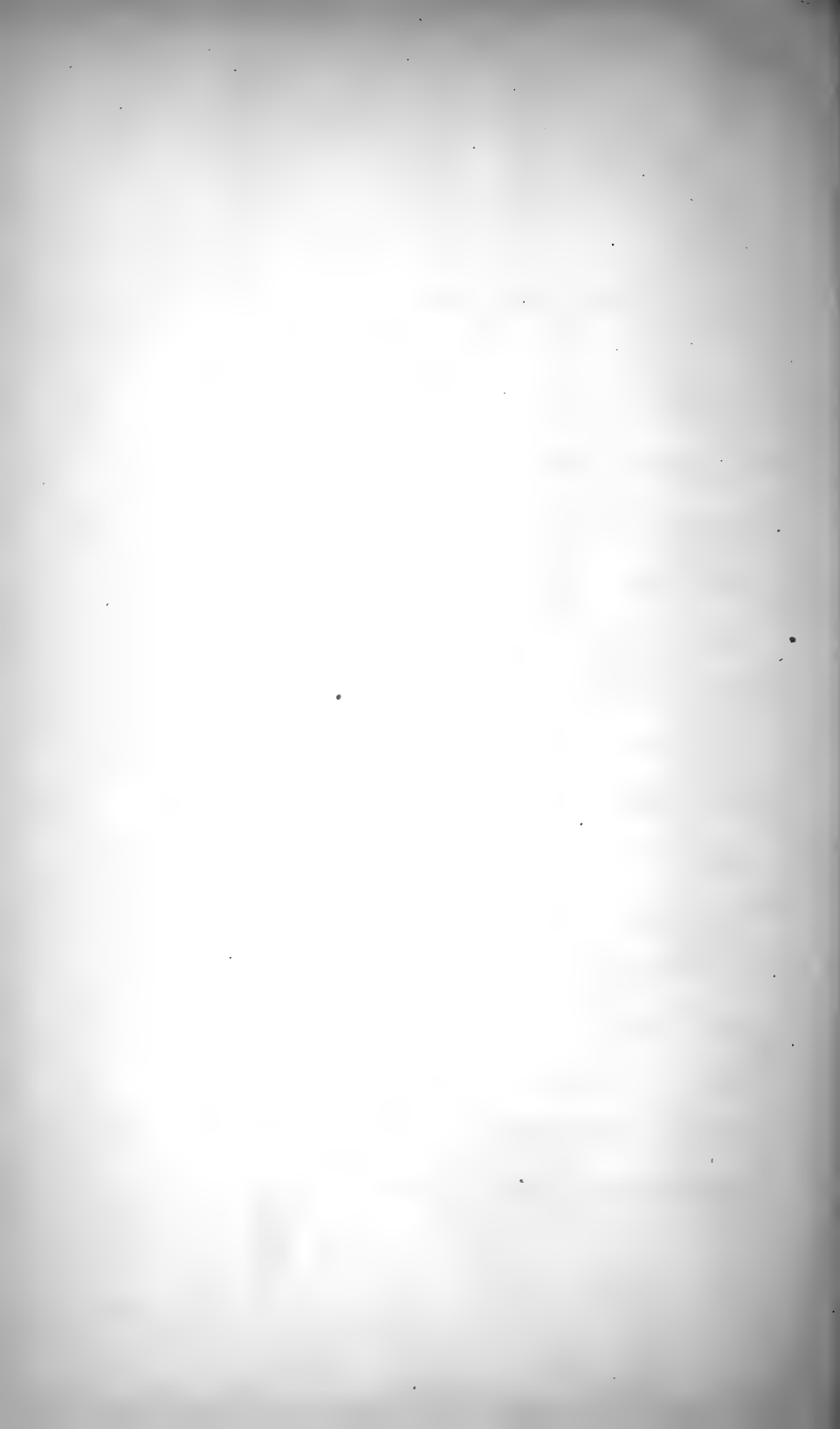




614. *PODILYMBUS PODICEPS* (L.) LAWR.  
**Pied-billed Dabchick.**
615. *ALCA IMPENNIS* L.  
**Great Auk.**  
[Extinct ?]
616. *UTAMANIA TORDA* (L.) LEACH.  
**Razor-billed Auk.**
617. *FRATERCULA CORNICULATA* (NAUM.) GRAY.  
**Horned Puffin.**
618. *FRATERCULA ARCTICA* (L.) STEPH.  
**Common Puffin; Sea Parrot.**
- 618a. *FRATERCULA ARCTICA* (L.) STEPH.,  
*var. GLACIALIS* (Leach) COUES.  
**Large-billed Puffin.**
619. *FRATERCULA CIRRHATA* (PALL.) STEPH.  
**Tufted Puffin.**
620. *CERATORHINA MONOCERATA* (PALL.) CASS.  
**Horn-billed Auk.**
621. *PHALERIS PSITTACULA* (PALL.) TEMM.  
**Parroquet Auk.**
622. *SIMORHYNCHUS CRISTATELLUS* (PALL.) MERREM.  
**Crested Auk.**
623. *SIMORHYNCHUS CAMTSCHATICUS* (LEPECH.) SCHL.  
**Whiskered Auk.**
624. *SIMORHYNCHUS PUSILLUS* (PALL.) COUES.  
**Knob-billed Auk; Least Auk.**
625. *PTYCHORHAMPHUS ALEUTICUS* (PALL.) BRANDT.  
**Aleutian Auk.**



626. **MERGULUS ALLE** (L.) VIEILL.  
**Sea Dove; Dovekie.**
627. **SYNTHLIBORHAMPHUS ANTIQUUS** (GM.) BRANDT.  
**Black-throated Guillemot.**
628. **SYNTHLIBORHAMPHUS**  
**WURMIZUSUME** (TEMM.) COUES.  
**Temminck's Auk.**
629. **BRACHYRHAMPHUS MARMORATUS** (GM.) BRANDT.  
**Marbled Murrelet.**
630. **BRACHYRHAMPHUS KITTLITZII** BRANDT.  
**Kittlitz's Murrelet.**
631. **URIA GRYLLE** (L.) BRUNN.  
**Black Guillemot; Sea Pigeon.**
632. **URIA COLUMBA** (PALL.) CASS.  
**Pigeon Guillemot.**
633. **URIA CARBO** (PALL.) BRANDT.  
**Sooty Guillemot.**
634. **LOMVIA TROILE** (L.) BRANDT.  
**Common Guillemot; Murre.**
635. **LOMVIA ARRA** (PALL.) COUES.  
**Thick-billed Guillemot.**



## EXTINCT SPECIES.

---

1. UINTORNIS LUCARIS MARSH.
2. AQUILA DANANA MARSH.
3. BUBO LEPTOSTEUS MARSH.
4. MELEAGRIS ANTIQUUS MARSH.
5. MELEAGRIS ALTUS MARSH.
6. MELEAGRIS CELER MARSH.
7. GRUS HAYDENI MARSH.
8. GRUS PROAVUS MARSH.
9. ALETORNIS NOBILIS MARSH.
10. ALETORNIS PERNIX MARSH.
11. ALETORNIS VENUSTUS MARSH.
12. ALETORNIS GRACILIS MARSH.
13. ALETORNIS BELLUS MARSH.
14. TELMATORNIS PRISCUS MARSH.
15. TELMATORNIS AFFINIS MARSH.



16. *PALÆOTRINGA LITTORALIS* MARSH.
17. *PALÆOTRINGA VETUS* MARSH.
18. *PALÆOTRINGA VAGANS* MARSH.
19. *SULA LOXOSTYLA* COPE.
20. *GRACULUS IDAHENSIS* MARSH.
21. *GRACULAVUS VELOX* MARSH.
22. *GRACULAVUS PUMILUS* MARSH.
23. *GRACULAVUS ANCEPS* MARSH.
- 23bis.\* *GRACULAVUS AGILIS* MARSH.
24. *ICHTHYORNIS DISPAR* MARSH.
- 24bis.† *APATORNIS CELER* MARSH.
25. *PUFFINUS CONRADI* MARSH.
26. *CATARRACTES ANTIQUUS* MARSH.
27. *CATARRACTES AFFINIS* MARSH.
28. *HESPERORNIS REGALIS* MARSH.
29. *LAORNIS EDWARDSIANUS* MARSH.

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\*Not in the Key. (Marsh, Am. Jour., Sci. and Arts, v, p. 230, March, 1873.)

†Not in the Key. This species, with No. 24, represents a new order, *Ichthyornithes*, of a new subclass, *Odontornithes*. (Marsh, Am. Jour., Sci. and Arts, v, p. 161, Feb., 1873.)





APPENDIX  
CONTAINING  
ADDITIONS AND CORRECTIONS  
TO THE CHECK LIST.

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PREPARED under circumstances of remote isolation which deprived the author of the advantage of certain works of reference he desired to consult, the CHECK LIST contains some names for which no authority is cited, and in a few instances a change of the authority given may be required.

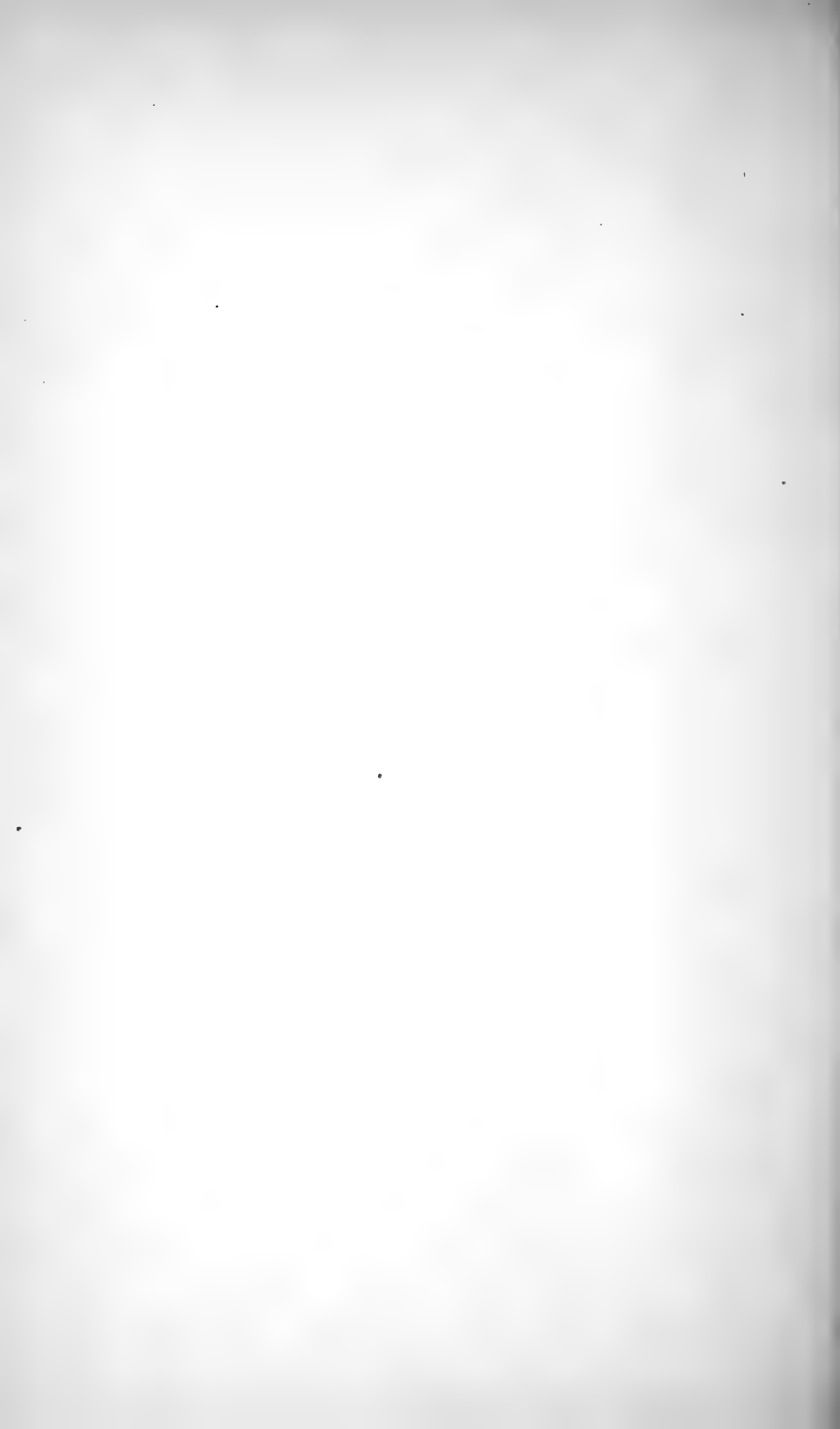
One new species has been added to the North American fauna during the printing of the List; five additional known species have since been ascertained to occur in this country, and meanwhile several new varieties have been published after the impression had passed the page where they should respectively appear; these are brought into the present connection. Most of them appear entitled to varietal recognition; but in printing the names formally, for the convenience of those who may desire to use such names in labelling, the author must not necessarily be held to endorse them in every instance.

The body of the List was printed, and some early copies distributed, in Dec., 1873; but the publication of the volume was held over until 1874, to insert in the Appendix names then about being published.

---

No. 41? The query indicates a probability that this is a variety of No. 40, as held by Mr. Allen.

No. 46. The United States form constitutes a variety of true *mexicanus*. See Ridgway, Am. Nat., vii, 1873, 603.



46. **CATHERPES MEXICANUS** (Sw.) Bd.,  
*var. CONSPERSUS* Ridg.

**White-throated Wren.**

No. 53a. The *pale* western *Eremophila*, not the same as the small bright southwestern *var. rufa*, may be distinguished as

- 53b. **EREMOPHILA ALPESTRIS** (FORST.),  
*var. LEUCOLEMA* Coues.

**Prairie Lark.**

No. 55bis. The following species, a straggler from Asia, is in the Smithsonian Institution from St. Michael's, Alaska, and should take place in the list.

- [55bis.] **ANTHUS PRATENSIS** BECHST.

**Meadow Pipit.**

No. 68. The Pacific form is varetally distinguishable. See Ridgway, *Am. Nat.*, vii, 1873, 606. The Floridan form, later distinguished by Mr. Ridgway as *var. obscurus*, seems hardly worthy of recognition by name.

- 68a. **HELMINTHOPHAGA CELATA** (SAY) Bd.,  
*var. LUTESCENS* Ridg.

**Golden Orange-crowned Warbler.**

No. 88. On the Mississippi Valley form, see Ridgway, *Am. Nat.*, vii, 1873, 606.

- 88a. **DENDRÆCA DOMINICA** (L.) Bd.,  
*var. ALBILORA* Bd.

**White-browed Yellow-throated Warbler.**

No. 99? The probability mentioned in the text may be regarded as assured.

No. 102. The Pacific form is varetally distinguishable. See Ridgway, *Am. Nat.*, vii, 1873, 608.

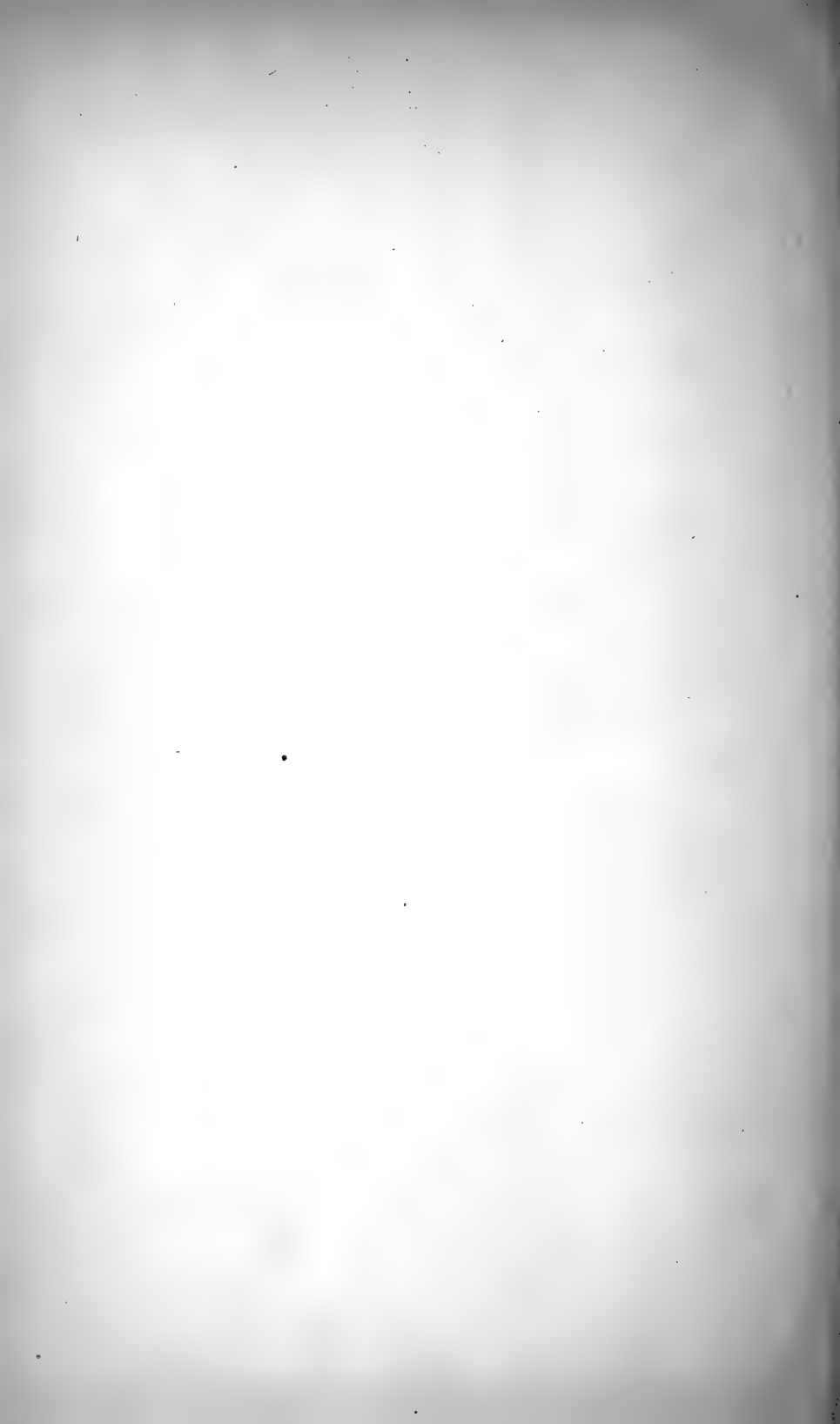
- 102a. **MYIODIOCTES PUSILLUS** (WILS.) Bp.,  
*var. PILEOLATA* (Pall.) Ridg.

**Pacific Flycatching Warbler.**

[No. 106.] According to Baird and Ridgway, *Am. Nat.*, vii, 1873, 612, this should stand as *C. bahamensis*.

- [106.] **CERTHIOLA BAHAMENSIS** Reich.

**Honey Creeper.**



No. 135a. The *C. elegans* of Baird (not of Swainson) has been re-named *C. ludovicianus* var. *robustus*, a name which, however, it may not be necessary to adopt. (Am. Nat., vii, 1873, 609.)

[No. 138]? The query indicates that the determination of specific validity, cited and adopted in the Key, may have been made by Dr. Tristram on grounds held in the Key to constitute only geographical varieties; so that we may revert to the view of its original describer as *P. coccinea* var. *cassini* Bd.

[138.] **PYRRHULA COCCINEA,**

var. *CASSINI* Bd.

**Cassin's Bullfinch.**

No. 144. The *Leucosticte tephrocotis* var. *australis* Allen, lately described by Mr. Ridgway (Ess. Inst. Bull., v, 197), I believe to be merely the midsummer plumage of the ordinary bird, as my *Ægiothus* var. *fuscescens* probably is of *A. linaria*.

No. 155. For chestnut-colored read chestnut-collared.

" 157. Omit the query, which should have been affixed to the next species.

No. 157bis. To be cancelled. See Scott, Am. Nat., vii, 1873, 564; Coues, *ibid.*, p. 696.

No. 165. There is a curious small blackish form of this species from Florida, which has been distinguished (Bull. Ess. Inst., v, 198) as

165a. **AMMODROMUS MARITIMUS** Sw.,

var. *NIGRESCENS* Ridgw.

**Dusky Seaside Finch.**

No. 170a. Mr. Ridgway has lately demonstrated to my satisfaction that *Peucæa cassini* is a distinct species; the bird which I called "var. *cassini*" is a variety of *æstivalis* which he proposes to call var. *arizonæ*. Am. Nat., vii, 1873, 616. So the species and varieties will stand:—

170a. **PEUCÆA ÆSTIVALIS** (LIGHT.) CAB.,

var. *ARIZONÆ* Ridg.

**Arizona Pine Finch.**

170bis. **PEUCÆA CASSINI** (WOODH.) BD.

**Cassin's Pine Finch.**

No. 173. A very notable variety of *Poospiza belli*, from Nevada, has lately been characterized (Bull. Ess. Inst., v, 198). It is much larger, paler and grayer, with streaked interscapulars.

173a. **POOSPIZA BELLI** (CASS.) SCL.,

var. *NEVADENSIS* Ridg.

**Nevadan Finch.**



No. 174. The form of *Junco* with white wing-bars, noted in the Key, p. 141, is named *J. hyemalis* var. *aikeni* Ridgway, Am. Nat., vii, 1873, 616. See also Pr. Bost. Soc., xv, 1872, p. 201.

174a. **JUNCO HYEMALIS** (L.) Scl.,  
var. AIKENI Ridg.

**White-winged Snowbird.**

Nos. 175? 176? The queries indicate the gradation with No. 174 noted in the Key, p. 141.

No. 183a. The true *Z. leucophrys* var. *gambeli* is a Pacific coast form, from which the Middle Coast form has been distinguished (Bull. Ess. Inst., v, 198) as

183b. **ZONOTRICHIA LEUCOPHRYS** (FORST.) Sw.,  
var. INTERMEDIA Ridgw.

**Ridgway's Sparrow.**

No. 206. For Canon read Cañon.

" 210. The prairie form has been characterized as *Dolichonyx oryzivorus* var. *albinucha* Ridg. (Bull. Ess. Inst., v, 198), a name it may not be necessary to adopt.

No. 216. For Dandin read Daudin.

" 220. For Girand read Giraud.

" 226. For Nuttallii read Nuttalli.

" 229a. For Gairdnerii read Gairdneri.

" 237. The question of synonymy left open in the Key, p. 166, has been determined (Bull. Ess. Inst., v, 199) as follows: "*A. sordida*" of the Key is a new variety, *arizonæ* of *ultramarina*, the true *sordida* being a Mexican variety of the same species. Accordingly, No. 237 should stand as

237. **APHELOCOMA ULTRAMARINA** (BP.) CAB.,  
var. ARIZONÆ (Ridg.)

**Arizona Ultramarine Jay.**

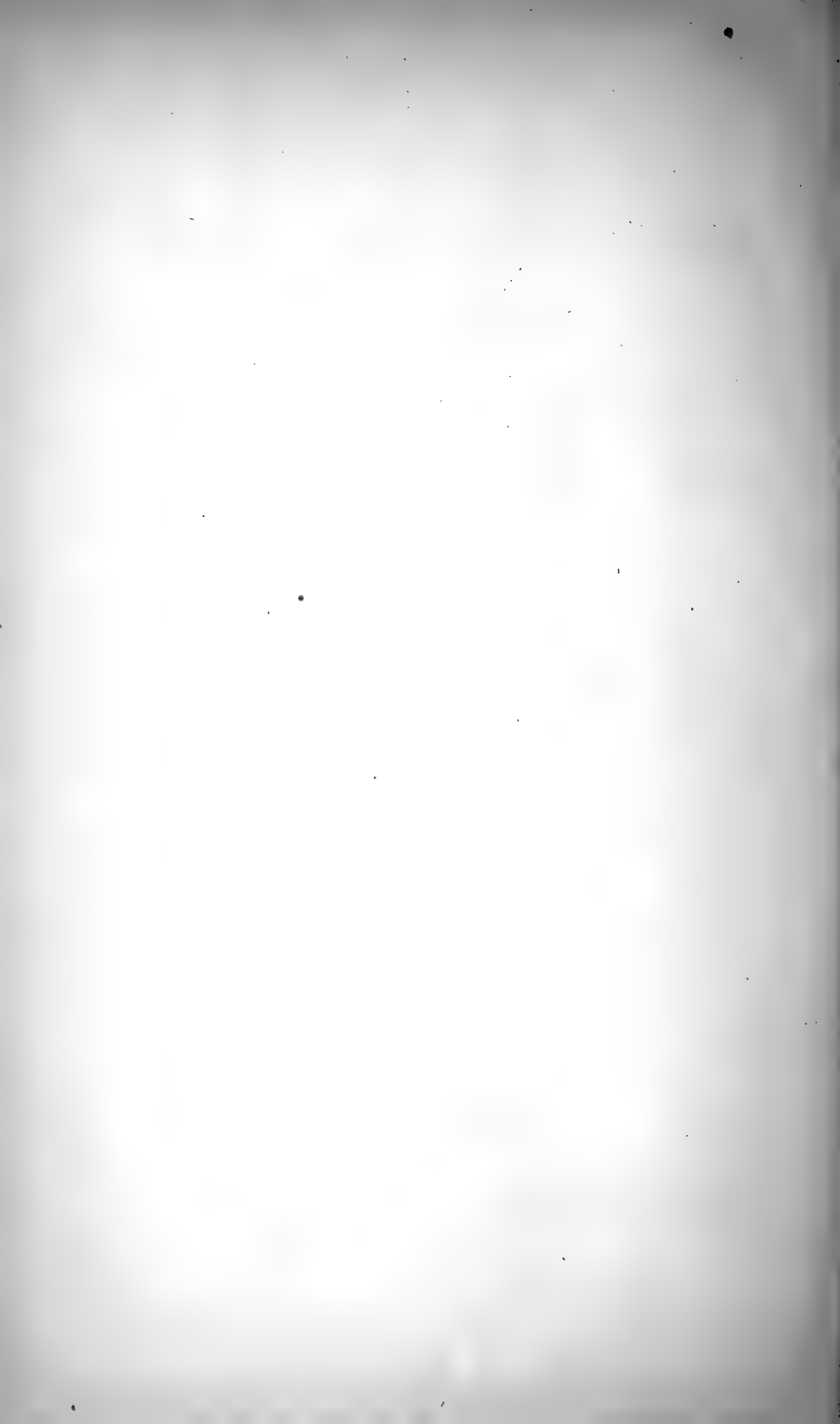
No. 239. Two varieties of Canada jay, one from Alaska, the other from the Rocky Mountains, have lately been named (Bull. Ess. Inst., v, 199).

239a. **PERISOREUS CANADENSIS** (L.) BP.,  
var. OBSCURUS Ridg.

**Dusky Canada Jay.**

239b. **PERISOREUS CANADENSIS** (L.) BP.,  
var. CAPITALIS Bd.

**Rocky Mountain Jay.**





No. 274bis. A fine species of humming bird has been discovered by Mr. H. W. Henshaw to inhabit Arizona, and has been determined by Mr. Lawrence to be *Eugenes fulgens*. (Am. Nat., viii, 1874, in press.)

274bis. **EUGENES FULGENS** (Sw.).

**Refulgent Hummingbird.**

No. 279. The authority is (LESS.) BP.

“ 281. The authority is (LESS.) GLD.

“ 292. The authority is (LATH.) NUTT.

“ 303? This species, queried in the text, and in Key, p. 195, may be regarded as a variety of 302, the intergradation, through 302a, proving complete. See Ridgway, Am. Jour., iv, Dec., 1872.

302b. **SPHYRAPICUS VARIUS** (L.) Bd.,

*var.* RUBER (Gm.) Ridg.

**Red-breasted Woodpecker.**

Nos. 304, 305. Observations lately made by Mr. H. W. Henshaw (Am. Nat., viii, 1874, in press) are to the effect that *Sphyrapicus thyroideus* is the female of *S. williamsoni*. The opposite sexes of each of these species have not been satisfactorily recognized, and upon examination of Mr. Henshaw's material, I find almost conclusive evidences in favor of his views, substantiating his observations. Such sexual differences are unique in the family. As the older name, *S. thyroideus* will stand for the species, *S. williamsoni* becoming a synonyme. No. 305 is therefore to be cancelled.

No. 307. The authority is (WAGL.) GRAY.

No. 318. A dark Floridan form of *Scops* has been characterized under the following name (Bull. Ess. Inst., v, 200) :—

318c. **SCOPS ASIO** (L.) BP.,

*var.* FLORIDANUS Ridg.

**Floridan Screech Owl.**

No. 320. The authority is FLEMING.

“ 321. The authority is (BECHST.) BP.

“ 322. The term *cinereum* has priority over *lapponicum*; the bird should stand as

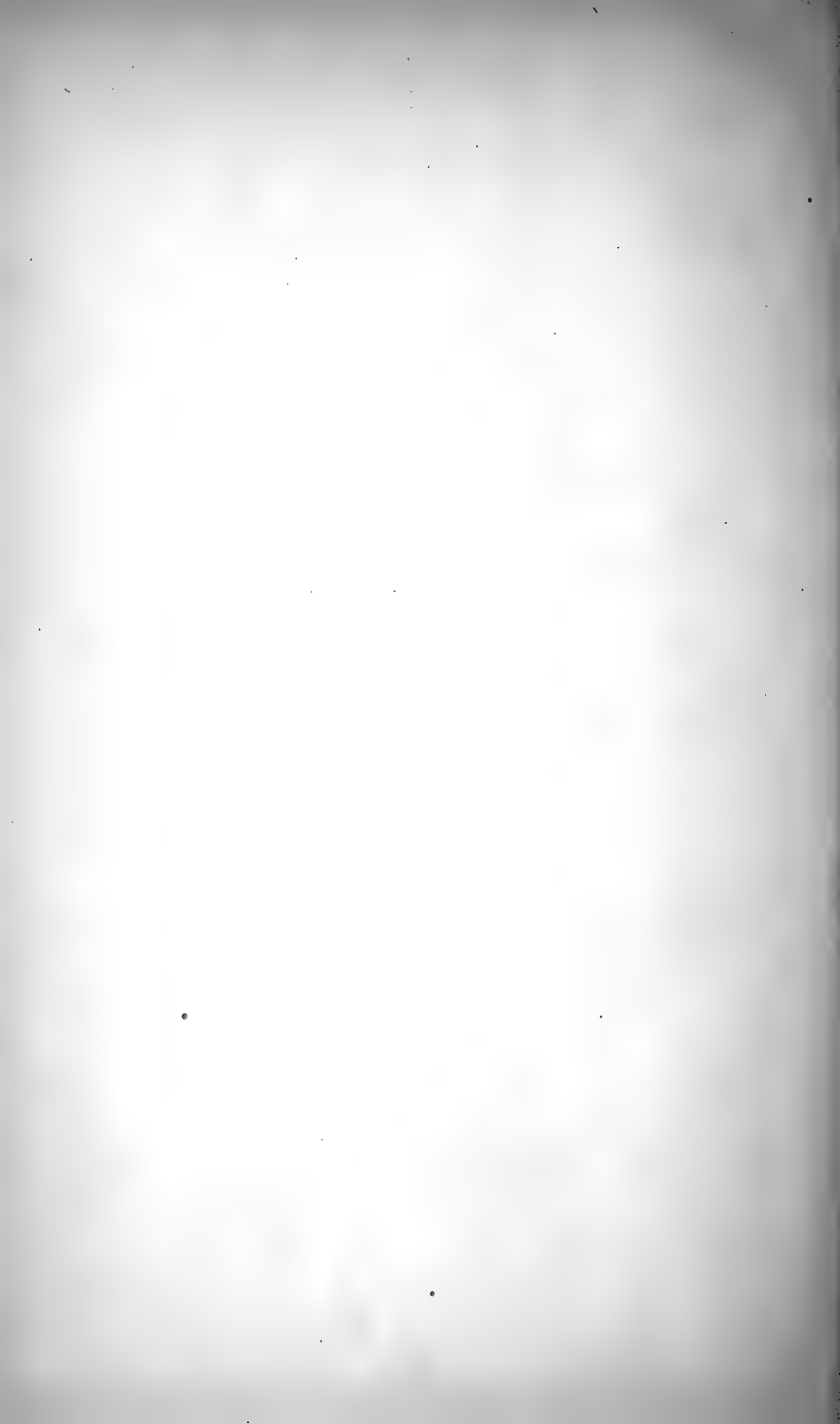
322. **SYRNIUM CINEREUM** (Gm.) AUD.,

**Great Gray Owl.**

No. 327. The authority is (Gm.) BP.

“ 329. The authority is (L.) BP.

“ 330. The authority is (MAX.) KAUP.



Nos. 343, 344. The dark northwest coast forms of duck hawk and pigeon hawk respectively have been named (Bull. Ess. Inst., v, 201) as follows:—

343a. **FALCO COMMUNIS** GM.,  
*var. PEALEI* Ridg.

**Peale's Duck Hawk.**

344a. **FALCO COLUMBARIUS** L.,  
*var. SUCKLEYI* Ridg.

**Suckley's Pigeon Hawk.**

No. 351c. The authority is HOOPES, Pr. Phila. Acad., 1873, 238, pl. 5 (Iowa).

No. 381. A dark form of *Tetrao obscurus*, from Sitka, has lately been characterized (Bull. Ess. Inst., v, 199): it is more like true *obscurus* than like *var. richardsoni*, having the broad terminal slate bar of the tail.

381b. **TETRAO OBSCURUS** SAY,  
*var. FULIGINOSA* (Ridg.).

**Sitkan Dusky Grouse.**

No. 384. A pale form of *Cupidonia*, from Texas, has lately been characterized (Bull. Ess. Inst., v, 199):—

384a. **CUPIDONIA CUPIDO** (L.) BD.,  
*var. PALLIDICINCTA* Ridg.

**Texas Prairie Hen.**

No. 400. A variety of this species is described by Mr. Ridgway, (Am. Nat., viii, 1874, 109), as *A. melodus var. circumcinctus*, having the black pectoral band complete.

400a. **ÆGIALITIS MELODUS** (ORD) CAB.,  
*var. CIRCUMCINCTUS* Ridg.

**Missouri Piping Plover.**

No. 400bis. A new species of *Ægialitis* is described from San Francisco by Mr. Ridgway (Am. Nat., viii, 1874, 109).

400bis. **ÆGIALITIS MICRORHYNCHUS** RIDG.

**Slender-billed Plover.**

No. 401. The American form of *Æ. cantianus* may be considered



varietally distinct from the European (see Ridgway, Am. Nat., viii, 1874, 109).

401. **ÆGIALITIS CANTIANUS** (LATH.),

*var. NIVOSUS* (Cass.) Ridgw.

**Snowy Plover.**

No. 402\*. As intimated in the text, the North American mountain plover is perfectly distinct from the Asiatic. I have only lately seen it in breeding dress: it has *no* black pectoral band, but a transverse black coronal belt and black loreal stripe.

402. **EUDROMIAS MONTANUS** (TOWNS.) HARTING.

**Mountain Plover.**

No. 415a. It is not necessary to recognize this even by varietal name; "*M. scolopaceus*" being merely longer-billed specimens of *M. griseus*, such as may be shot out of almost any flock of the latter. The range of variation in length of bill is no greater than that occurring in *Ereunetes pusillus*, as noted in the Key, p. 254.

No. 442bis. A well known Pacific curlew, before overlooked in the Smithsonian collection, was taken at Fort Renai, Alaska, May 18, 1869, by F. Bischoff, and should be added to the last as a straggler.

[442bis.] **NUMENIUS FEMORALIS** PEALE.

**Bristle-bellied Curlew.**

No. 445. According to Mr. Ridgway (Am. Nat., viii, 1874, 110), the ordinary North American glossy ibis is absolutely identical with that of the Old World. He, however, finds two other species in western United States, *I. guarauna* and *I. thalassinus*. According to this determination our species would stand as follows:—

445. **IBIS FALCINELLUS** AUCT.

**Glossy Ibis.**

445bis. **IBIS GUARAUNA** (LINN.) RIDG.

**White-faced Ibis.**

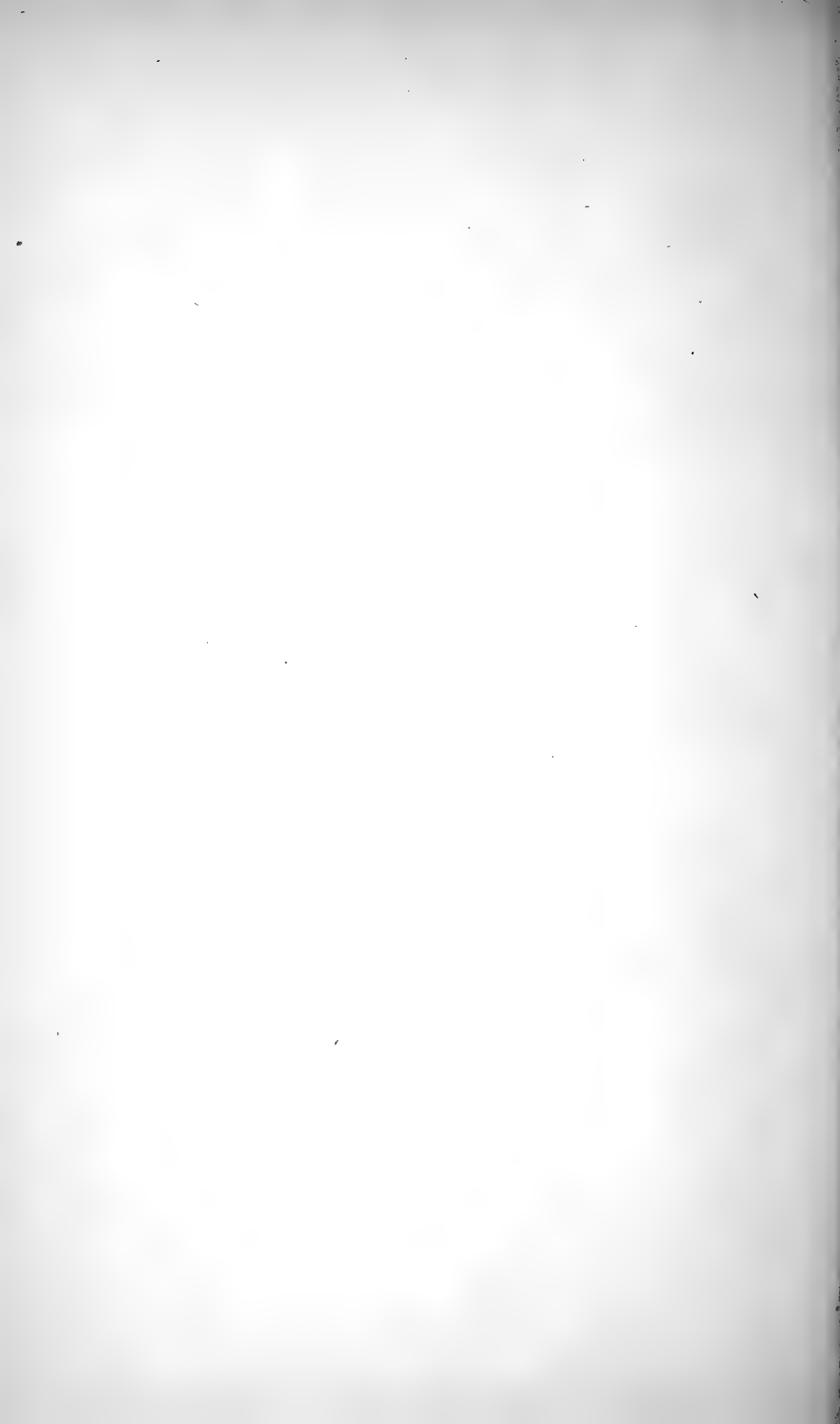
445ter. **IBIS THALASSINUS** RIDG.

**Green Ibis.**

No. 448bis. I am informed by Prof. Baird that the Jabiru, of Central America, was taken some years since at Austin, Texas. It should enter the list as a straggler.

[448bis.] **MYCTERIA AMERICANA** L.

**Jabiru.**



No. 450? For occasion of the query see Key, p. 267.

No. 466. A pale form is described from California. See Ridgway (Am. Nat., viii, 1874, 111).

466a. **RALLUS ELEGANS** AUD.,

*var. OBSOLETUS* Ridg.

**Californian Rail.**

No. 470. A peculiar variety of the black rail is described from the Farallones by Mr. Ridgway (Amer. Nat., viii, 1874, 111).

470a. **PORZANA JAMAICENSIS** (GM.) CASS.,

*var. COTURNICULUS* Bd.

**Pacific Black Rail.**

No. 472. The relationships of this form to the European *G. chloropus* require further investigation. It will probably stand as

472. **GALLINULA CHLOROPUS** LATH.,

*var. GALEATA* (Licht.) Hartl.

No. 479? Compare Key, p. 282.

No. 489. A lighter colored form of dusky duck, with a buff throat, is described from Florida (by Mr. Ridgway, *l. c.*), where it is resident.

489a. **ANAS OBSCURA** GM.,

*var. FULVIGULA* Ridg.

**Floridan Dusky Duck.**

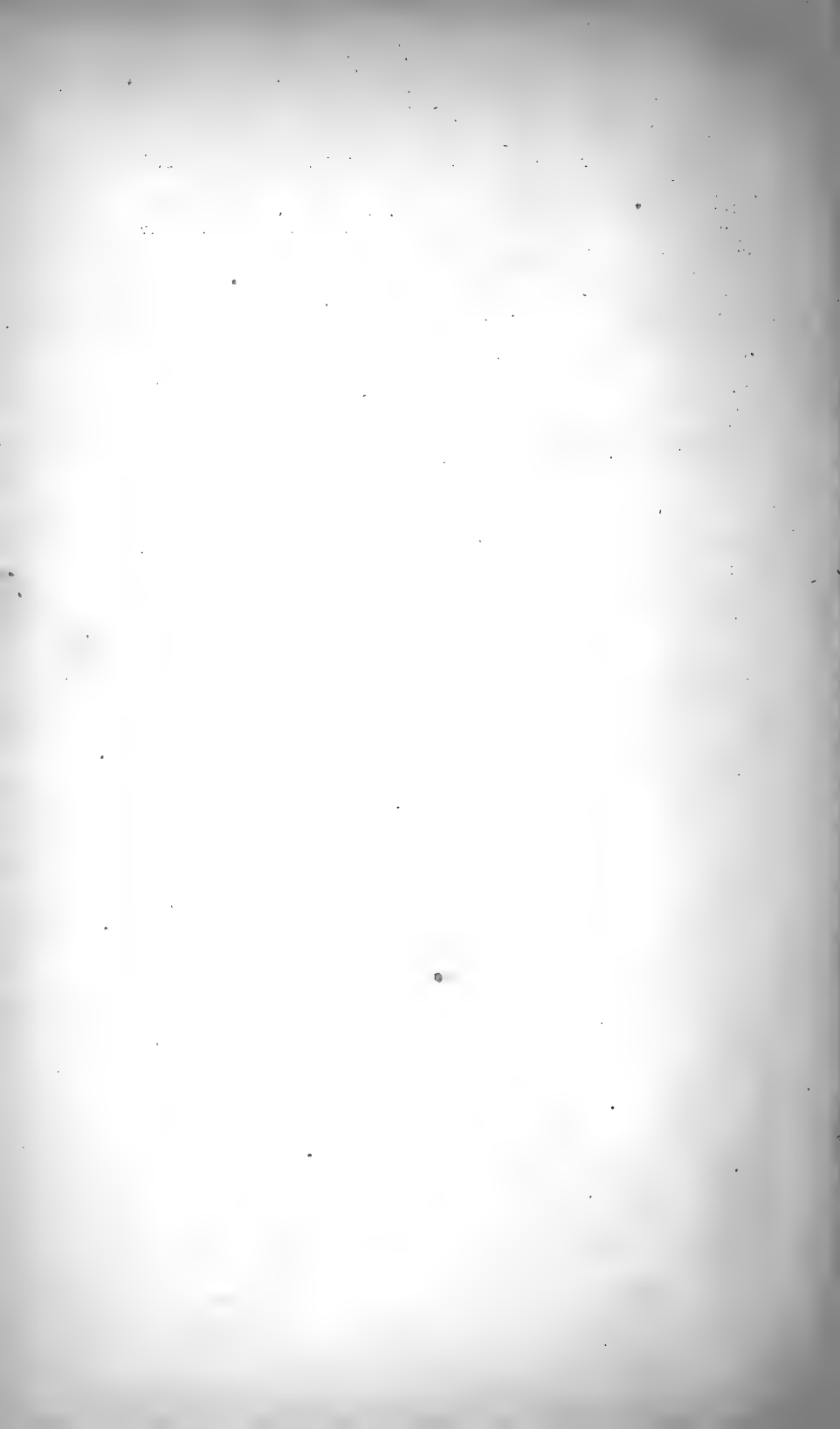
No. 493? The query indicates probability of only varietal distinction from No. 492.

No. 501? The query indicates probability of only varietal distinction from No. 500.

No. 575bis. A specimen of the European white-winged tern, *Hydrochelidon leucoptera*, was taken in Wisconsin, July 5, 1873, by Th. Kumllein, and presented to the Smithsonian by Dr. Brewer. This is the first instance known of its occurrence in this country.

[575bis.] **HYDROCHELIDON LEUCOPTERA** (MEIS.) BOIE.

**White-winged Black Tern.**





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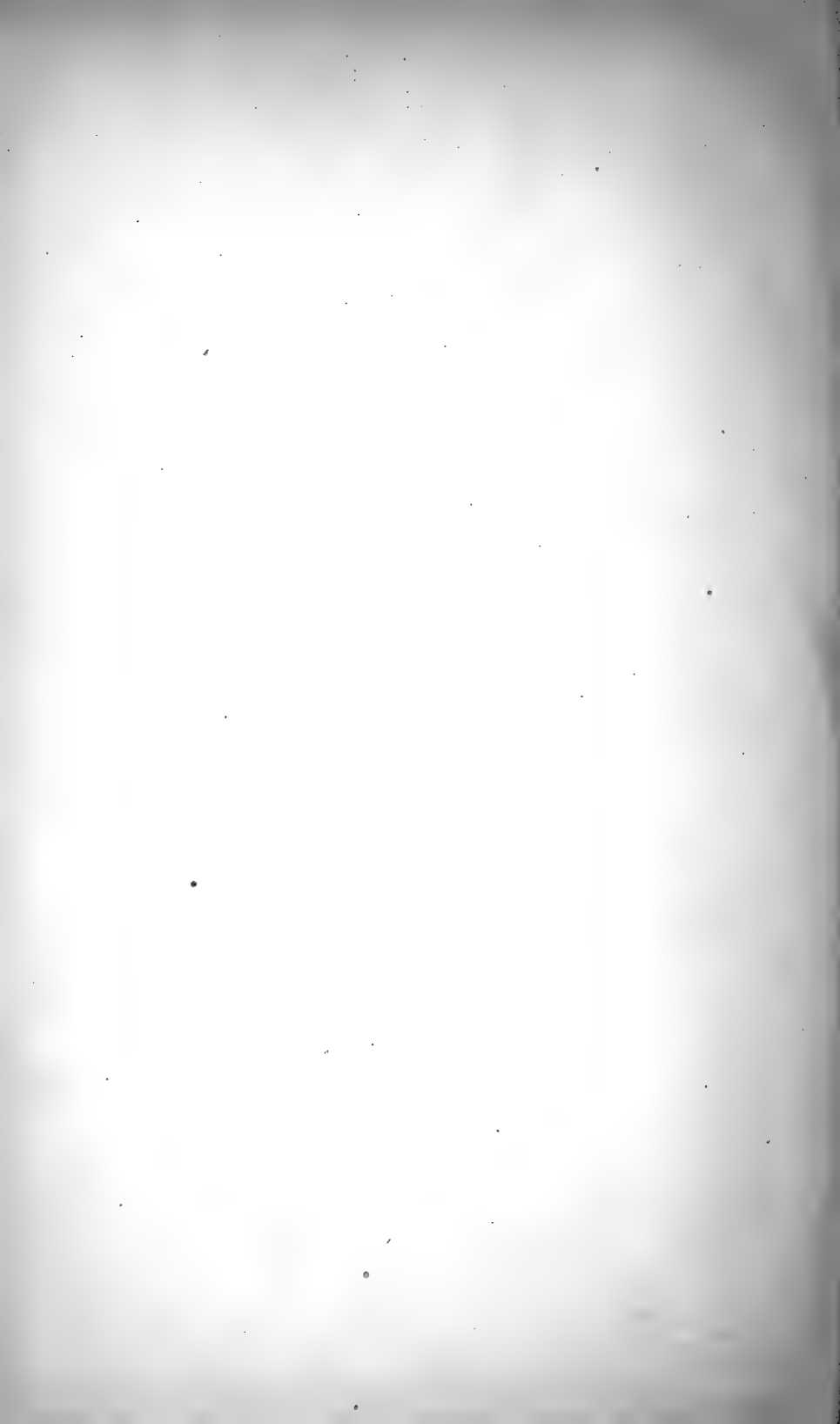
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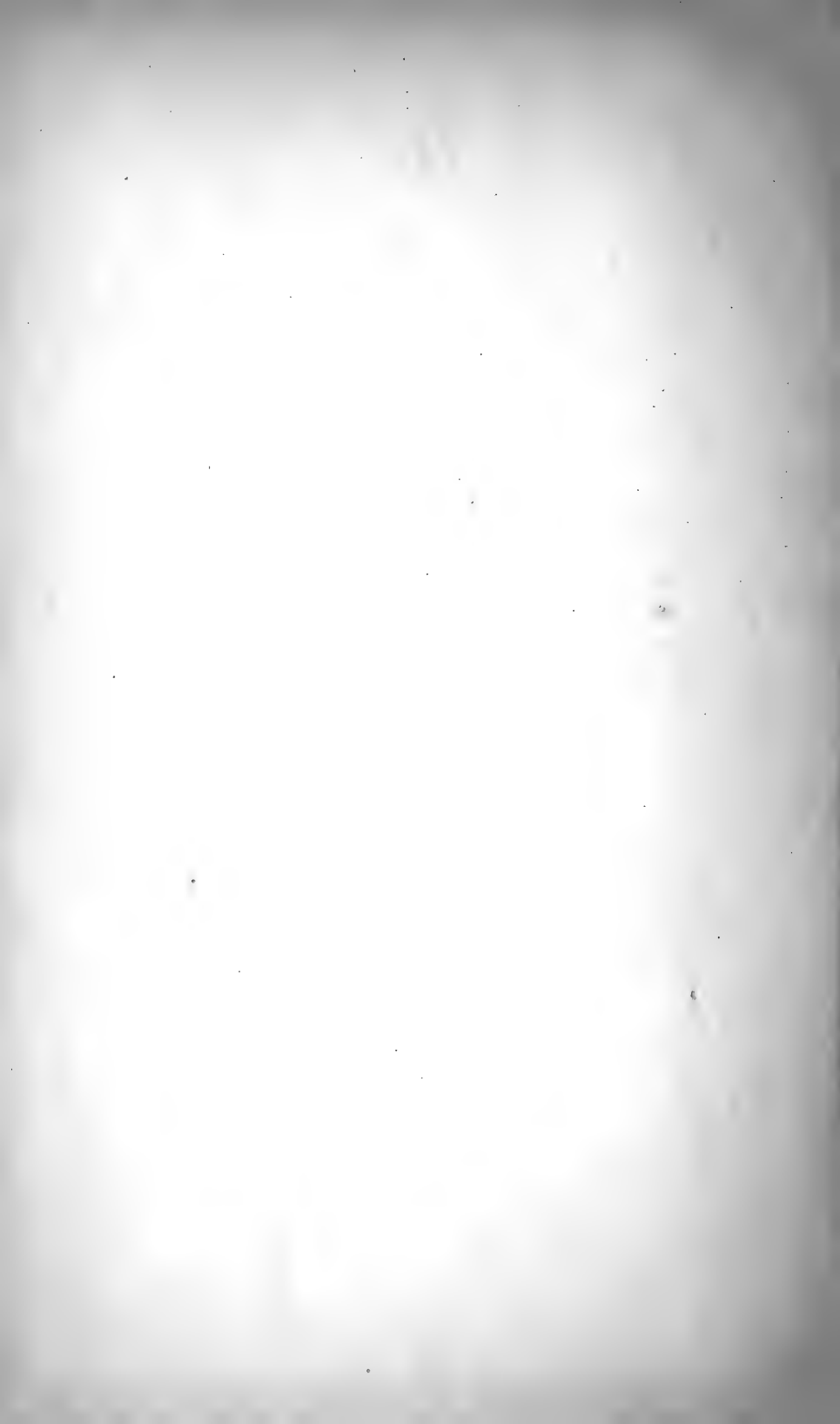
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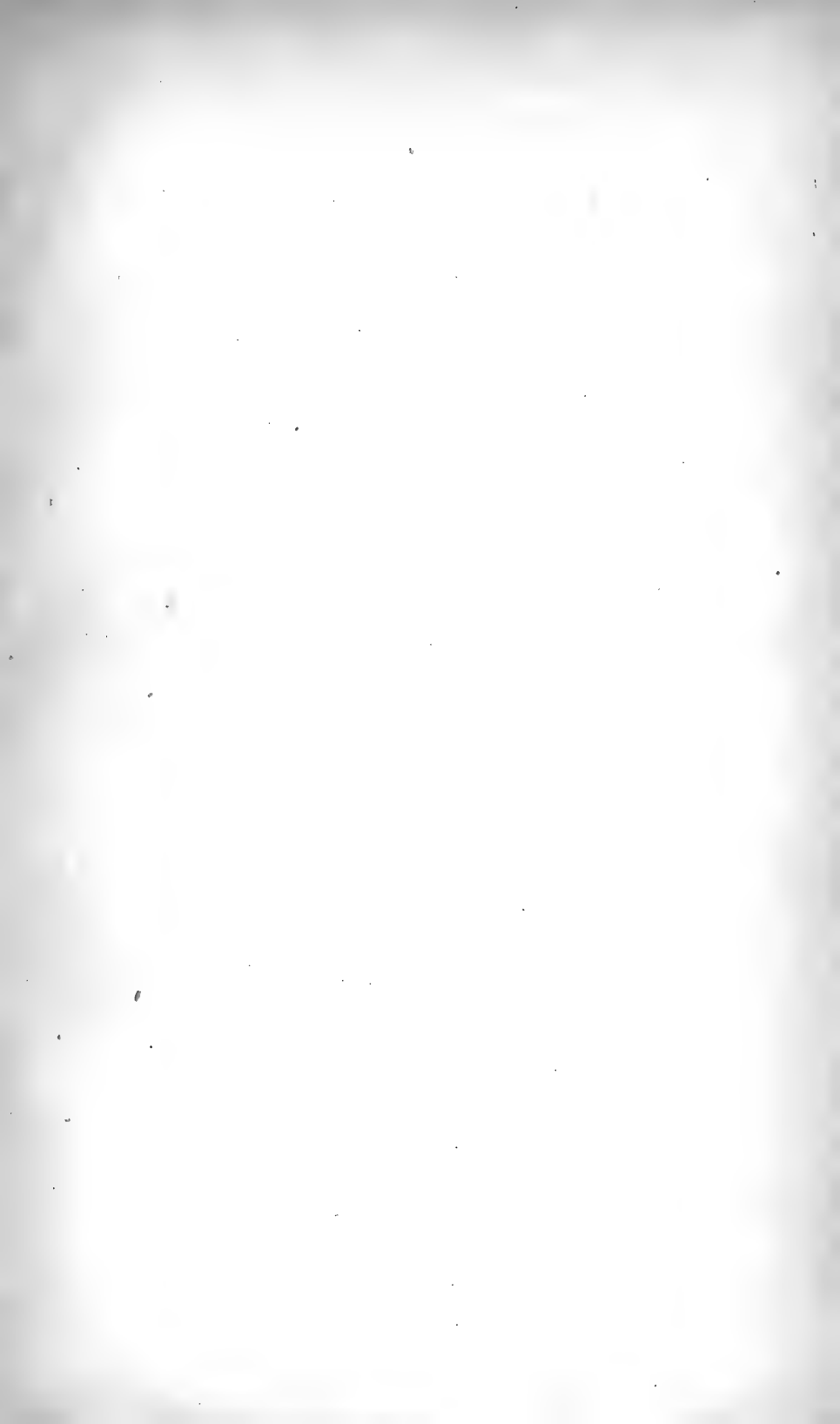
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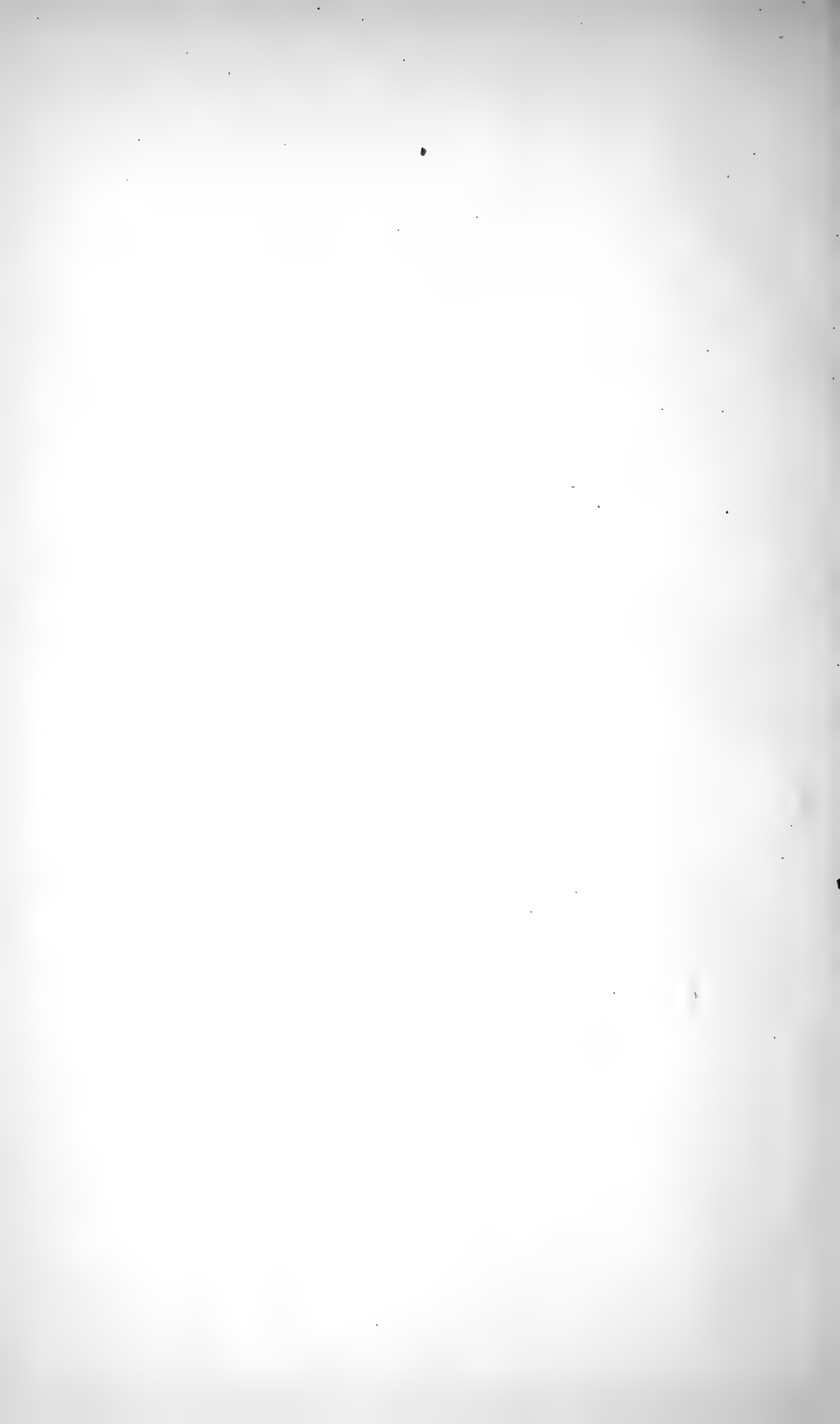
"And the high commendation it has received, from competent authorities in this country and England, is even more than justified by the accuracy of description, the fulness of detail, the convenience of classification, and the admirable arrangement of the volume. \* \* \* Dr. Coues, still a young man, and connected with the United States Army, has spent a long time in obtaining the materials for his work; but in it industry is subordinate to tact, and art to genius. He is a born naturalist. He is a close and fine observer of all natural phenomena, and were he wrecked on a rock in mid ocean he would commence scientific researches before his clothes were dry. \* \* \* And he writes as well as he observes, in a clear, accurate style, colorless in itself, but transmitting the native hues of the objects he describes. And these qualities appear in the work before us, to enhance its value. \* \* \* We have no hand-book of similar character, and none that occupies the place it completely fills."—*Golden Age*, July 5, 1873.



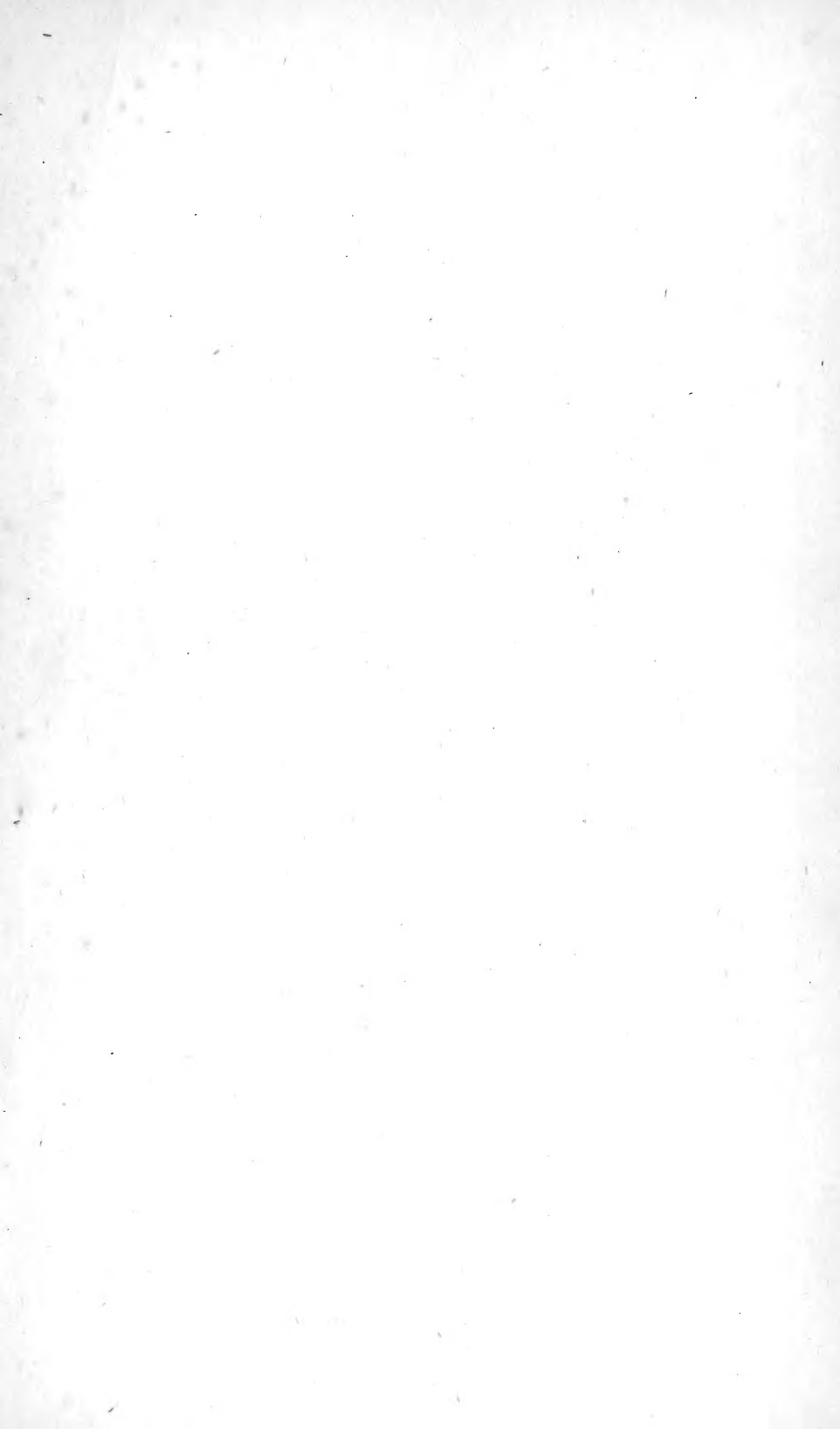
















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