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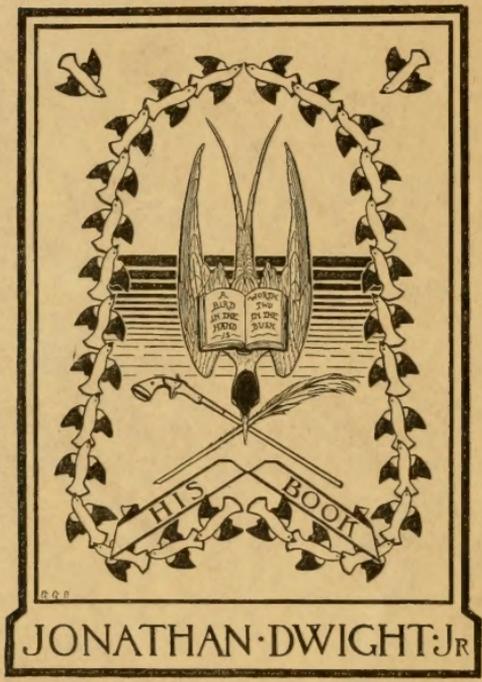
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# Our Ducks



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I visit Lewis & Clark  
with the  
Outfitters Company

at  
St. Louis Mo.  
May 16<sup>th</sup> 1899.



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1899 OUR DUCKS  
BIRD

Edw. Innes  
May 22, 1899.

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A HISTORY OF AMERICAN DUCKS

NESTING, ROOSTING, FEEDING  
AND PLAYING GROUNDS

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HABITS THROUGHOUT THE YEAR

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*Fredrick*  
—BY—  
F. HENRY YORKE, M. D.

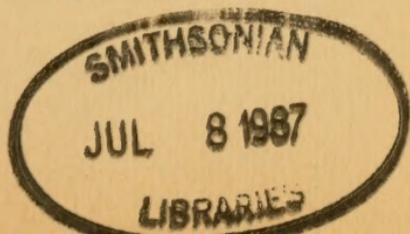
*728*  
Author of "Days With Our Upland Game Birds,"  
"Days With Our Waterfowl."

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1899



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## TABLE OF CONTENTS.

	PAGE.
CHAPTER I.	
OUR DUCKS, . . . . .	5
CHAPTER II.	
NON-DIVERS, . . . . .	8
CHAPTER III.	
COLD AND WARM WEATHER BIRDS, . . . . .	10
CHAPTER IV.	
WARM-WEATHER BIRDS, . . . . .	18
CHAPTER V.	
DIVERS—COLD-WEATHER DIVERS, . . . . .	32
CHAPTER VI.	
WARM-WEATHER DIVERS, . . . . .	49
CHAPTER VII.	
INSTINCT VERSUS REASON, . . . . .	54
CHAPTER VIII.	
ADAPTATION OF FOODS TO SOIL, DEPTH OF WATER, ETC.	58
CHAPTER IX.	
PROPAGATING NEW GROUNDS AND REPLENISHING OLD WITH SEEDS, BULBS, ROOTLETS AND FLOWERS, . . . . .	65
CHAPTER X.	
WINGED BIRDS—WHAT BECOMES OF THEM, . . . . .	69
CHAPTER XI.	
FOODS OF THE VARIOUS DIVERS, . . . . .	71
CHAPTER XII.	
FOODS OF THE VARIOUS NON-DIVERS, . . . . .	73
CHAPTER XIII.	
COVER ATTRACTIONS FOR DIVERS—DEEP BAYS, SHORES, SLOUGHS AND POCKETS OF LAKES, PONDS, RIVERS, ETC.	76
CHAPTER XIV.	
NESTING RANGES OF NON-DIVERS FROM GULF OF MEXICO TO BRITISH AMERICA AND ISLANDS BEYOND—WITH KEY ON LATITUDINAL LINES, . . . . .	78

## TABLE OF CONTENTS.

	PAGE.
CHAPTER XV.	
NESTING RANGES OF DIVERS FROM GULF OF MEXICO TO BRITISH AMERICA AND ISLANDS BEYOND—WITH KEY ON LATITUDINAL LINES, . . . . .	79
CHAPTER XVI.	
ENEMIES OF SEEDS, BULBS, ROOTLETS AND FLOWERS, . . . . .	81
CHAPTER XVII.	
ENEMIES OF DUCKS, . . . . .	83
CHAPTER XVIII.	
EGGS TO DUCKLINGS, . . . . .	85
CHAPTER XIX.	
DUCKLINGS TO FLAPPERS, . . . . .	89
CHAPTER XX.	
FLAPPERS TO FLYERS, . . . . .	91
CHAPTER XXI.	
NORTHERN FALL FLIGHT, . . . . .	93
CHAPTER XXII.	
LOCAL FLIGHTS—ROOSTING, FEEDING AND PLAY GROUNDS, . . . . .	95
CHAPTER XXIII.	
SOUTHERN FLIGHT OF NON-DIVERS HATCHED IN THE UNITED STATES, . . . . .	100
CHAPTER XXIV.	
SOUTHERN FLIGHT OF DIVERS HATCHED IN THE UNITED STATES, . . . . .	102
CHAPTER XXV.	
FALL MIGRATORY FLIGHT OF DUCKS NOT HATCHED IN THE UNITED STATES, . . . . .	103
CHAPTER XXVI.	
SOUTHERN FLIGHT SOUTH OF THE FROST LINE, . . . . .	106
CHAPTER XXVII.	
NORTHERN FLIGHT SOUTH OF THE FROST LINE, . . . . .	108
CHAPTER XXVIII.	
MIGRATORY SPRING FLIGHT, . . . . .	110
CHAPTER XXIX.	
LIST OF SEEDS, BULBS, TUBERS, ETC., COMPRISING OUR WATERFOWLS' ESPECIAL FOOD—WITH GRASSES, CANES, FLAGS, ETC., FOR COVER, . . . . .	116

## CHAPTER I.

### OUR DUCKS.

There is only one United States. With it no country can compare. A land of enlightenment, energy and industry whose wealth, profusely scattered through its length, breadth and depth, affords investment and employment to the world at large. Peculiarly adapted is its wide range and diversity of climate, an attribute endowed by nature. Visit the "Sunny South," home of the orange and magnolia, a land of birds and flowers, an ideal resting place for our migratory birds. Travel north and we pass an imaginary frost line, between  $30^{\circ}$  and  $35^{\circ}$ , parallel, the line of demarcation during the winter solstice of our various migratory birds; thus northward, over the lake regions, until we arrive at the Canadian border, where, situated on the confines of North Dakota, stands Fort Pembina, opposite to St. Vincent, the coldest signal service station in the United States. During the year of 1860, the thermometer dropped to  $60^{\circ}$  below zero, and in the winter of 1892 the writer saw it  $54^{\circ}$  below at Hallock, a town upon the Great Northern Railway, eighteen miles south of the line, ten miles distant from the Great Red River of the North (which divides Minnesota from North Dakota), exposed to "all the airts that blow," whereas St. Vincent is to some extent protected by the river bluffs which fringe it on the Minnesota side.

What country can vie with this in diversity of climate? From a land of fruit and flowers, gorgeously colored birds and sunny skies, to lands of snow and ice, hail and blizzards; where spring jumps into summer, and fall is suddenly embraced in the icy grasp of winter? Its boundless fields of hard and northern wheat lying upon a fenceless level, beautiful moonlight nights and magnified stars; where brilliant auroras and mirages are frequently observed through the pure dry air of the winter months? This variability of climate renders our country admirably adapted for the immense flocks of migratory waterfowl which inhabit it, notwithstanding some travel further north, even beyond British America to its sea-girt islands; conversely, some scatter through Mexico, the West India Islands and down to South America.

The fly-ways up and down our great rivers and their tributaries, connecting with our chains of inland lakes, enable our waterfowl to spread over the entire country; extending shooting privileges unsurpassed by those of other nations. It proves the greatest boon ducks could have, for it alone restricts the annual spring and fall migration to this continent, instead of passing to other countries, as in Europe, according to the habits and peculiarities of the various species. It affords them a range of breeding grounds in every state in the Union, sparingly in the south to the frost line, but rapidly increasing after they pass the 42° parallel and nature admonishes them to increase, multiply and replenish the earth.

Enjoying the possession of the finest game country the world has produced, our sportsmen have been and

still are wrestling with a problem apparently hard to solve: "What has become of our ducks?" Notwithstanding new state laws have been proposed and enacted, offenders punished, new game wardens appointed and "tot homines tot sententiæ" have written volumes on the subject, the same stern, hard facts remain regardless of them all. Where are our bisons which a few years ago roamed from Mexico to Canada upon their native heath, the wonder and admiration of the world; whose tread shook the earth like an advancing army and the warmth of whose robes formed the surest protection from the chill of the northern blizzards? Where are our pigeon roosts? Miles upon miles of timber still bear the shock of their nesting grounds, in the shape of broken and distorted branches, dead and lifeless limbs whose boughs once tossed their green and beautiful foliage hap-hazard to the breeze still stand mute witnesses of bygone days. Once the thunder of wings, of crashing boughs and branches, drowned all outward sounds as they rose to darken the sun in quest of food for their callow broods. Only a few scattered flocks and pairs remain! Killed to satiate the hungry maws of selfish market hunters! Our ducks will soon be in the same predicament, if we do not diligently and earnestly seek to discover the true cause, and apply the proper remedy ere it be too late. In the history of every country, business reverses, panics and failures constantly occur, eventually proving blessings in disguise, owing to the fact that new ways, projects and means are continually being devised and formulated to confront them, based upon the errors of past experiences.

## CHAPTER II.

### NON-DIVERS.

All ducks are divisible into two classes, non-divers and divers, whereby we can examine more closely the habits peculiar to each species and group together those whose traits are similar.

A non-diver, as the name implies, does not dive for its food. It frequents shallow water, where food can be procured, either upon the surface or below it, by tipping up without its entire body becoming submerged. It does not use deep channels, lakes or ponds, except for drinking or where the food floats upon the surface, or may be found upon its banks. Their feet differ from those of the divers; the tarsi are longer, web of the hind toe shorter, whole web shorter and narrower, and the legs are placed further forward on the body. Many species use the land nearly as much as the water, have less down upon their breasts and bodies, call more in the air as well as upon the water, and are as a general rule more frequently observed. We have eleven species common to the United States, some of which breed in every state in the Union. All are fit for the table. A marked difference in color exists in the sexes, the young assume the sober dress of their mother, and the drakes are more numerous than the ducks in the ratio of about five to three.

A non-diver will dive to escape when wounded, usu-

ally in the direction of some cover in which it may obtain concealment. It cannot remain long under water, but will rise to the surface to obtain air by the projection of its bill, hidden from view by some friendly lily pad or bunch of weeds, its body remaining submerged or flattened upon the surface. A duck, although webfooted and able to swim and dive, does not constitute a diver in the true sense of the word. In like manner, many water-birds can swim and dive, without their feet being webbed; in fact, some of our expert divers, apart from the *Anatida* family, are not entirely webfooted. Nearly all our waders can swim, especially those which have close feathers covering down upon their breasts. A beautiful range of variation exists between the waders and the full webbed. For instance, take the long toes with palmations extending between two or more, as in the *Limicolæ* or shore-birds; observe the phalaropes, rails and gallinules, the coot or mudhen with lobe-feet; great divers and swimmers. Then the grebe family, which has a foot intermediately between those of the coots and the ducks, almost forming a web; they can remain under water and travel a long distance before rising to the surface, resembling the actions of loons. Thus, from the simple form of the wader's foot the web is increased, through the various species, until the full and perfect type is obtained; a very material point in waterfowl.

## CHAPTER III.

### COLD AND WARM WEATHER BIRDS.

Non-divers can readily be divided into two groups, cold and warm weather birds, between which we find a wide difference in nesting, range, habitat, food and flight.

Cold-weather birds arrive upon their spring migration whilst the ground is frozen and water exists only in channels and running streams, solid or floating ice still remaining upon still-water lakes and ponds; and return at the fall migration, when the ice and snow compel them to leave their northern homes. The cold weather birds of our non-divers are the yellow-leg mallard, pintail or sprigtail and greenwinged teal; all of which conform to the above rule, with the exception of the pintail, which returns in the fall before the ice is formed.

True cold-weather birds, as a general rule, breed north of latitude  $45^{\circ}$ , whereas true warm-weather birds breed from  $25^{\circ}$  north, and the chain is completed by other ducks, both divers and non-divers, which can be placed intermediately between them. Even families give the most striking contrasts, for example: The greenwinged teal is a true cold-weather bird, which breeds from latitude  $45^{\circ}$  north, whereas the bluewing and cinnamon teal are true warm-weather birds breeding from  $25^{\circ}$  north. A contrast is seen in the mergansers; the common merganser and red-breasted mer-

ganser are true cold-weather birds, hunting the icy streams for frozen fish, breeding north of  $45^{\circ}$ , whereas the hooded merganser is more of a warm than a cold weather bird, breeding from  $25^{\circ}$  north, yet it will endure very severe cold weather as long as it can find open water and live fish to supply its wants. Again, take the mallards—the yellow-leg or ice mallard—a true cold-weather bird, that breeds sparingly even at  $50^{\circ}$  north latitude, compared with the red-leg mallard or its cousin the black duck, both warm-weather birds and breeding from  $30^{\circ}$  to  $35^{\circ}$  northward.

I attribute the fact of a warm-weather bird adapting itself to cold weather, to acclimation; for the first issue of any bird, diver or non-diver, breeds the farthest north; the second and third in like proportions; for all our ducks which breed far south—between  $35^{\circ}$  and  $45^{\circ}$ —are birds which formed the third or last issue in their spring migration, the gradual advance north of all species being a case of necessity, having been forced northward by the march of civilization which has with rapid strides altered the nesting places and food supply by deep drainage, tiling and cultivation. It may be claimed by some that the age of the bird determines the northern limit and that the young birds are the most southerly nesters; but I think the birds that were hatched in the far north would instinctively return to the same places, or, at least, the same latitude, provided the surroundings were unchanged.

Hybrids as well as albinos seem to occur more frequently amongst the non-divers, judging from the fact they are more frequently observed and specimens obtained.

SUBFAMILY *Anatidæ*—GENUS *Anas*.

*Anas boschas*—MALLARD (yellow-leg variety).—Habitat.—This mallard has never been officially distinguished from the red or orange-colored-leg variety, probably, owing to its range of flight and similarity of plumage. If we examine it closely, probably, we may find many peculiar habits which differ from the commoner kind; so much so that future investigation will determine its status in the *Anatidæ* family. By the hunters of the South, near the frost line, it is not infrequently termed "Ice Mallard," owing to the fact that it is one of the first species of ducks to arrive in the spring, following up the melting ice, also one of the last to come down from the north driven by the severity of the weather with its frost and snows. Some stay above the frost line between  $30^{\circ}$  and  $35^{\circ}$ , according to the mildness of winter, but is rarely to be found north of  $40^{\circ}$  even in open winters. They like to hang as it were, upon the outskirts of winter, where water and food can be obtained. The majority frequent the swamps, sloughs, bayous and large overflowed river bottoms as far as the Gulf of Mexico.

They have three distinct flights or issues during their migrations both north and south, the spring flight being more plainly observed. The first arrives north of the frost line as soon as the first glimpse of water can be seen from melting snow, rain or water holes. The second issue arrives about ten days after, but not before the first has departed, moreover it stays longer. The third issue arrives a few days after the second has left, staying but a brief period, the ratio

of time altogether depending upon the amount of water and food supply. In the fall migration the first issue can be observed after cold weather has begun, with its storms of snow and sleet; should this continue, and a freeze-up follow, they pour down from above the Canadian line, excepting those hatched in the far north, which, however, are working their way toward our boundaries. The first and second issues can usually be distinguished by their numbers, even if one succeeds the other rapidly. They appear loath to leave the north, and hang around as long as water can be found and no snow be present; for snow will drive ducks back more than any other weather. They attain their full plumage by the time they reach the borders of the United States. The spring flight is practically over the same grounds during a wet spring, although they now merely pass by many places where twenty years ago they swarmed over the country. The fall flight is over the various chains of lakes and sloughs, down the large water-courses; the wetness of the fall determining their abundance or scarcity.

The feeding grounds are in wheat, barley and corn fields, sloughs, shallow lakes and ponds. They are very fond of the various berries which grow so profusely upon the northern islands and mainland of the extreme north, and which greet them upon their spring arrival; the bulk of which they could not obtain in the fall, owing to the snow which covered them, but which under its snowy mantle kept sweet and fresh for their spring supply.

The playgrounds are open water in corn or barley fields, pond holes, in sloughs, musquaid, etc. Their

nesting grounds are near edges of lakes, sloughs, musquads, rushbeds and on the islands and mainlands of the far north; they nest from 50° north to the most northern islands of North America. Their clutch is from eight to ten, of a white greenish color. It is, practically, a prairie bird; although it may and does inhabit ponds, lakes and bayous surrounded by timber, it does not frequent the mast covered glades or oak-openings like the red-leg mallard, nor does it mix to any extent with them; furthermore, should one or two become mixed in a flock with them, they can readily be detected.

Its food consists of many varieties, which may be found in a chart I have appended to save repetition, as many of the non-divers eagerly seek the same food.

All measurements are taken from drakes, the ducks ranging smaller: Length 23.50; wing 10.75; tarsus 1.60; extent 36.00; middle toe 2.00.

#### GENUS *Dafila*.

*Dafila Acuta*—PINTAIL, SPRIGTAIL.—Habitat.—Commonly distributed through the United States, especially between the Alleghany and Rocky Mountains to Alaska, British America and beyond.

The spring migration above the frost line commences with the first breaking up of winter; the ducks follow the open pools of water to be found in sloughs, lakes and rivers, and with the yellow-leg mallard are the first of the non-divers to start for their northern nesting grounds. They arrive in three distinct issues, the first leaving, in bulk, at least, before the second arrives; these stay about a week before they proceed

northward. An absence of pintails, for three or four days, generally follows before the third issue puts in an appearance, which stay a week or ten days, according to the weather, then travel northward, breeding chiefly south of the Canadian line.

In the fall migration they differ from other cold weather birds of the non-divers in returning south before the cold weather sets in; in fact, the first frost finds those which bred in the United States rapidly wending their way toward the frost line. The first issue to come down in the fall usually leaves the northern part of Minnesota and North Dakota about the end of August. They associate a good deal with the bald-pates and gadwalls, using the same feeding, roosting and playgrounds in the fall, not associating with them in the spring owing to their having gone north several weeks before them and feeding to a large extent upon grain and corn fields. The second fall issue generally overtakes the first before they reach the frost line. They collect in some quiet piece of water, migrate at night and never return that fall. They do not assume their full plumage north of the frost line.

The feeding grounds in the spring are in corn, wheat and barley fields, sloughs, wild rice, barley and rye, edges of lakes and on river bottoms. In the fall they feed more on seeds and down rice, in shallow water in the south and middle states, but in the grain fields and musquaid north. Their playgrounds are in open places of water, where lilies and lotus or wild rice abound. Their roosting grounds are in bays or inlets of lakes, rivers, etc., and sloughs surrounded by weeds and grasses where they feed at night. The

nesting grounds commence from 40° parallel and increase as they approach the Canadian line, whence they spread to 75°.

The pintails are the only cold-weather birds breeding south of 41°, of the non-diver family. Their diet consists of various foods; see chart. Their clutch is ten to twelve greenish blue or whitish eggs. It is a prairie bird in the west and north, only frequenting the wooded lakes south, where a food supply exists, but not going into the timber beyond its edges. Length 29; wing 11; tarsus 1.75; extent 36.00; middle toe 2.00.

#### SUBGENUS *Nettion*.

*Anas Carolinensis*—GREEN-WINGED TEAL.—*Habitat*.—Throughout the American continent to British America, Alaska and beyond. The greenwinged teal has three principal flights, the Atlantic, the Pacific, and the Mississippi River; the latter branches off west, up the Missouri River, and from the Fox Lake Chain of Lakes northward and eastward to Hudson's Bay, through the Illinois and Ohio rivers.

The spring migration of this the smallest of our non-divers closely follows the mallard and pintail, frequently being associated with them during its flight, especially the mallard. The first issue arrives a day or two after the pintails and follows up the rivers, lakes and sloughs, usually preferring the edges of muddy banks. This issue stays only a short time and departs before the second arrives, usually about four or five days intervening; the second issue spreads over the country and is often joined by the third, staying for several weeks before they travel northward. At

times the third issue is delayed, probably, by overflowed lands in the south, where food is found in abundance; in such cases the third issue rushes by, or stays only a day or two late in the season.

During their fall migration they never arrive until driven down by cold weather (excepting a few which may breed in the United States), and the second issue follows rapidly after them; for a week or two they hang around where they can find cover and food; the first heavy snowstorm or driving sleet heralds the arrival of the third issue, and they with the yellow-leg mallards are the last of the non-divers to rush down from the wintry north. They are in full plumage at that time, and the birds which are killed in the fall in immature plumage are those which breed south of the Canadian line. The feeding grounds are in quiet corners of down rice, muddy ponds, sloughs, margins of lakes and rivers, musquais, etc., in corn, wheat and barley fields where muddy water stands.

The playgrounds are in the open sections of water partly covered with lily or lotus leaves, or rushes scattered here and there, especially down rice, barley or flags, where they can be easily concealed. The roosting grounds are in open ponds, holes in wild rice or flags, edges of lakes, sloughs, musquais, river bottoms, willows near muddy banks, etc. The nesting grounds are from 48° parallel to 75° and islands beyond, Alaska and Hudson Bay especially.

They are both prairie and timber birds, according to location. Their clutch is from ten to sixteen whitish eggs. Length 14; wing 7; tarsus 1.20; extent 22.50; middle toe 1.30.

## CHAPTER IV.

### WARM-WEATHER BIRDS.

During the spring migrations true warm-weather birds do not arrive until the ice has melted and the frost has disappeared from the ground. They return during the fall migration, before real cold weather sets in; although a cold snap may occasionally catch them further north than usual, it is invariably followed by moderating weather, or a bountiful supply of food entices them to stay longer than usual. They are generally distributed throughout the United States, breeding in every state in the Union, and some families have two broods during the year. They form the local ducks of the state they breed in, spread over the state after they have passed from flappers to flyers, and travel northward in small flocks into adjoining states during their fall northern flight. They arrive later in the spring and migrate earlier in the fall, and as a rule are not full-fledged until they arrive near the frost line. They seem to dislike ice and snow in the spring more than in the fall, owing, probably, to the coldness of the water, avoiding to a great extent streams fed by cold springs. Nearly three-fourths of our ducks belong to this class, some of which approach the cold-weather birds so closely in many characteristics that they may be considered intermediately or between them.

The warm-weather birds of the non-divers are red-leg mallards, black ducks, blutewing and cinnamon

teals, gadwall or grey ducks, woodducks, spoonbills and baldpates, of which the bluewinged and cinnamon teals arrive the last in the spring and the first at the fall migration, with one exception; they are preceded in the fall by the first or local issue of woodducks.

GENUS *Aix*.

*Aix Sponsa*, WOODDUCK, SUMMERDUCK,—Habitat.—North America at large, to West India Islands; especially abundant in the vicinity of our large rivers, their tributaries and all timber-clad streams north to the British Possessions. The spring migration of this, our handsomest duck, unapproached by any save the hooded merganser and buffie-head, appears above the frost line after the ice has disappeared from our lakes and timbered sloughs. They arrive in three distinct issues, after sunset and through the night, suddenly appearing in the morning upon their accustomed haunts. The first stays but a brief period, and departs for the north to breed; the second puts in an appearance a few days later, but soon leaves to nest in the northern parts of the United States; the third arrives directly after the second leaves and scatters over the middle states to nest. This issue forms the local ducks of each state it breeds in. The first fall issue consists of these local ducks, which migrate during the early part of the month of September. The second comes down from the northern states about the end of September, while the last comes down in the early part of October. The second and third do not stay nearly so long as the first issue, which is the largest and collects in quantities on favorite grounds.

The second and third collect in a different manner; they drop into willows, buck-brush and on rivers and timber-clad ponds, in singles, pairs or little flocks, about nightfall, and depart before morning; these places are used by them nightly during their migrations, until all have gone south, and appear to be regular stopping places. The ducks of the third issue are full-fledged upon their arrival.

The feeding grounds are in oak slashes, willows, buck-brush, lily and lotus beds, wild rice (the blossom of which they are very fond of), smartweed and duckweed. The roosting grounds are in buck-brush, willows, timber-clad sloughs and pond holes. The playgrounds are in open water, found in timber and brush, in down rice and lily or lotus beds. The nesting grounds are in holes of trees, or stumps of trees whose tops have been broken or rotted off, in rat houses and holes in banks. Their food is—vide chart. Their cry is principally heard when disturbed, or from feeding birds attracting the attention of others passing by; it consists of two notes, *ō-ěčk*, uttered once or twice. It is a timber bird only crossing the prairies during its migrations.

Its clutch is from ten to fourteen greenish-colored eggs. The young are carried by the mother, when the nest is a height from the ground, by her beak, grasping the head or neck, or between her thighs steadied by the beak, and are deposited upon the ground at or near the foot of the tree; then are taken, after all are safely upon the ground, to the nearest piece of water. When nests are overhanging the water or close to the ground, the young are gently pushed from the nest by the mother, one by one.

The woodduck is the first of our fall migrants, preceding the cinnamon and bluewinged teals. The young are highly esteemed for food; the black and white striped side feathers, are largely used in the manufacture of artificial flies. Length 19; wing 9.50; tarsus 1.40; extent 28.50; middle toe, 1.65.

SUBGENUS *Querquedula*.

*Anas discors*—BLUEWINGED TEAL.—Habitat.—North America at large, Alaska; south to the equator, but not extending as far down as the cinnamon teal; also ranging eastward from the Mississippi, while the latter bird ranges westward.

The first issue of this our tenderest duck arrives in latitude 37° from March 25th to April 1st, staying about six or eight days. The second follows a few days after the first has departed northward, up to and past the boundary line. A short period elapses when they likewise travel north to the southern part of Minnesota and its parallel. The third soon follows, and stays an indefinite period, working up through Illinois, Indiana, Wisconsin and eastward about the last week in April if the weather permits, the Ohio, Missouri and Mississippi, with their tributaries, furnishing the fly-ways.

About the early part of August the local ducks of each state begin to work northward; during September they flock together and form the first flight, passing over the same grounds. The collecting or flocking together of the local birds, which form the first fall issue, presents an interesting sight. For nearly two days the ducks will be noticed as getting very uneasy,

whipping about without the regularity which had hitherto been customary upon their feeding, playing and roosting grounds. On the day of their departure, after feeding, they will flock to some large common playground; where, instead of quietly resting, as usual, they assume a stage of activity. About three in the afternoon, instead of drifting back to their feeding grounds as usual in little flocks, singles and pairs, they form flocks and sweep up and around the open water and alight again. The flocks soon increase in size and after two or three circles around the open water, each time rising higher and higher, they proceed south in well defined and distinct flocks, each under a leader, and soon vanish in the distance, never returning that fall. Three or four days of no shooting occurs, except upon those which were too weak and incapacitated for a long flight, before the second issue arrives, which stays a few days. A cold snap brings down the third, the weather determining the length of their stay. The second and third depart at night or late in the evening, but evince no disposition to assemble as the first. They are the second of our warm-weather birds to leave, closely following the wood-ducks.

Their feeding grounds are in down rice, inshore on duck and pond weed, frogbits, etc., sloughs, musquads and wide shallow flats. Their roosting grounds are in grassy places where water holes are to be found, in down rice and flags. Their playgrounds are in open water where rushes, lily and lotus abound, in holes surrounded by rice and flags, and in the buckbrush lined shores skirted by timber.

Their clutch is from eight to ten clear white eggs, in the southern and central states, where they frequently have two hatchings; in the north their number is often twelve to fourteen, when they have only one. They travel at the rate of about 130 miles an hour, exceeded only by the greenwinged teal. They are both a timber and prairie bird all over their range.

For nesting, see chart.

Like the bluebill, pintail, ringbill, etc., they are often stained upon the breast and head a rusty color, presumably, from frequenting water fed by iron springs, so numerous in the south. They mix a great deal with the coots, eagerly devouring the seeds of the teal moss, which the former by diving tear up by the roots, and the long sprays covered with seeds float upon the surface of the water. Length 16; wing 7.20; tarsus 1.20; extent 24.00; middle toe 1.40.

#### SUBGENUS *Querquedula*.

*Anas cyanoptera*—CINNAMON OR RED TEAL.—Habitat.—The western half of North America, from the Missouri and Mississippi rivers to the Pacific Coast; south to the lower part of South America. In range it is nearly opposite to the black duck, which ranges to the east.

The spring and fall flights or issues are almost identical with those of the bluewinged teal, regarding time of arrival and departure, as well as the peculiar assembling and migration in the afternoon. Their grounds are practically the same. Their notes in calling are similar, their flight and flocking together, speed and direct course scarcely differ; while the fe-

male of one so closely resembles the female of the other, that size and slight variation of color form the only guides.

It is both a timber and prairie bird. Its clutch is from ten to twelve pure white eggs; like the bluewing, southern birds frequently have two hatchings during the year. For food and nesting range, see chart.

Length 16.50; wing 7.50; tarsus 1.30; extent 24.00, middle toe 1.50.

#### SUBGENUS *Anas*.

*Anas boschas*—RED-LEG MALLARD.—Habitat.—North America to about 65° north latitude, south to Central America and West Indies. The migration of this our common timber and river duck in the south, the spring, summer and fall mallard of our northwest boundary, makes its first appearance in the spring, after the ice has entirely disappeared. The first issue arrives about latitude 36° during the months of February or March, according as the season is early or late, and remains for eight or ten days. The second follows a few days later, which also stays seven or eight days according to the amount of oakmast in the glades and smartweed in the timbered lakes. The third drifts through, and by the 1st of April are nearly gone. Those birds which travel up the Missouri stock the northwest; the Mississippi flight goes north and west; the Illinois River flight goes over the Fox Lake region, and some branching off, meeting others from the Wabash, go around Lake Michigan to the northeast.

The first fall flight consists of local ducks from Michigan, Iowa, Wisconsin up to the Minnesota southern

line and its parallel; those which come from Michigan sweep down Lake Michigan and enter the Fox Lake region, work northward over the chain of Fox, Grass, Marie through Wisconsin up to Lake Koskonong, stay three or four days and come back over the same grounds and head down the Illinois River, or over Calumet, Hyde, Wolf, etc., down the Wabash. The ducks of Northern Minnesota by this time, with others from North Dakota and Michigan, have come down and make the second issue; all of these ducks are not yet in full plumage. Those hatched over the boundary line come down in the same manner, after the local birds of the Dakotas, Minnesota and Michigan have gone; but by the time they arrive between  $42^{\circ}$  and  $38^{\circ}$  are full fledged, with green heads, the green-heads of the mallards of the local ducks being spotted with green only.

The feeding grounds south of  $42^{\circ}$  are in the Everglades, timbered ponds, where smartweed abounds along the large rivers, also over a great part of Michigan; but after they leave the timbered streams and the oakmast falls short, they spread over the barley fields, rice sloughs, musquaid, etc. Their roosting grounds are in ponds, inlets surrounded by timber or buckbrush, rice, willows and heavy grassy musquaid. Their playgrounds are in open water, in holes and all through timber under water, as the Everglades, wide water covered here and there with flags, rice, buckbrush, willows, etc., where they can rest without disturbance, hidden from view by the heavy cover existing there. Their nesting grounds are in grassy ponds, sloughs, buckbrush, flags, wild rice near water in the

south and central parts; but in the north and west they nest in barley and wheat fields, frequently half a mile from any water. The big musquaid in the north are favorite places, heavy cane, grasses and rice being found in profusion.

For food, see chart.

Their clutch is from six to eight greenish eggs, rudely placed in hay, weeds, etc., with little care or lining, in depressions and hollows, dead furrows, etc., in barley or wheat fields and prairies; often twenty to forty nests may be found in an area of one hundred acres, and thousands of nests in North Dakota and Minnesota are turned under by the plow every week in the spring. The plan of burning off the vast prairies there must be seen to appreciate its destructiveness; hundreds of burnt shells, in the nests, can be seen in the spring, where the grass was burned off late after nesting had begun.

This mallard becomes scarce east of the Ohio River, where its cousin, *A. obscura*, usurps its place; upon the other hand, *A. obscura* is scarcer the nearer it approaches the Mississippi.

The following description shows some difference, between the ice mallard or yellow-leg and the orange or red-leg. The red-leg being a timber bird where the acorn mast exists, but a prairie bird in feeding on the barley fields of the north and west; whereas the yellow-leg is a prairie bird always, rarely using the oak slashes and roosting on the prairie or wide open lakes in the south. Length 28; wing 11.20; tarsus 1.70; extent 38.00; middle toe 2.75.

SUBGENUS *Anas*.

*Anas obscura*—BLACK DUCK, BLACK MALLARD.—Habitat.—The black duck is entirely an eastern bird, whose western range extends to the Mississippi and Missouri rivers; south to West India Islands and Central America; north into Canada. After leaving the Ohio westward it becomes less frequent in proportion as the red-leg mallards increase.

Its spring flights are not easily determined in the Mississippi Valley, but become more so between the Ohio River, eastward, to the Atlantic Coast. The first issue travels north to breed above the United States border, but does not put in an appearance until the frost has all disappeared. The second issue breeds near the boundary line; whilst the third scatters over the middle and eastern states.

In the fall it migrates about the same time as the bluwinged teals and is frequently found with them. Some years they are plentiful, at others very few are to be found, even upon the best grounds. The feeding, roosting and play grounds are in similar places as the red-leg mallard. The nesting grounds are close to or upon the water's edge, in sedge, rushes, cane and flags.

It is both a timber and prairie bird. Its clutch is from eight to ten greenish eggs. Its call is a mild timid quack, more like to a spoonbill than a mallard. They decoy easily and are not hard to kill. Length 23; wing 11.00; tarsus 1.80; extent 36.00; middle toe 2.00.

SUBGENUS *Chaulelasmus*.

*Anas strepera*—GADWALL, GRAY DUCK.—Habitat.—Temperate North America to Canada, south to West

India Islands. The first flight of this duck puts in an appearance after the ice has entirely departed from the shallow lakes and sloughs. It is never found in great numbers, yet the ducks keep together in small flocks during their northern flight. The late issues drift through in greater or lesser quantities. During the fall migrations they mix with the bald-pates and pintails, owing, I suppose, to all of them using the same grounds at that season of the year. The first issue forms the principal one recognized, the others drift downward, rarely staying long in a place.

The feeding grounds are in shallow lakes, ponds, sloughs, musquais, etc. The roosting grounds are very similar to those of the pintail and bald-pate. The playing ground is among lily and lotus beds, tufts of smartweed where open water exists; in buck-brush and inlets surrounded by timber and brush.

For food, see chart.

Their call is a feeble quack, they are easy to decoy and shoot. Their clutch is from eight to ten creamy white eggs. Length 22; wing 10.50; tarsus 1.60; extent 34.00; middle toe 1.80.

#### GENUS *Spatula*.

*Spatula clypeata*—SPOONBILL SHOVELLER.—Habitat.—North America at large, to West Indian Islands; north to British Possessions. The migratory flights of this duck do not appear well marked; they being unequally distributed year by year. The first issue in the spring is well defined, occurring about the same time as the bald-pates and gadwalls, after the ice has entirely left the sloughs. The other issues are gradual driftings;

some years plentiful, others quite scarce. It is only during the migrations they are seen in flocks; afterward they are split up and mix greatly with other river ducks. During the fall migration, they appear in little flocks upon our northern boundary, but drift slowly through the states, staying for a short or long period, as food is abundant or not.

Their feeding grounds are upon the large open muddy flats, on shallow lakes, on mud bars of rivers, ponds and sloughs. Their playing grounds are on any piece of open water, which is shallow and contains rushes, weeds and brush. They roost in shallow grassy lakes, ponds, sloughs, musquaides and mud flats; on rivers and bottom lands. Their clutch is from ten to fourteen eggs, of a dirty white color with yellowish tinge.

For food and nesting grounds, see chart.

Their broad pectinated bills serve as a sieve, to separate the mud from their various foods. Their flesh is rather fishy in the spring, but excellent in the fall. Length 20.00; wing 9.50; tarsus 1.40; extent 32.50; middle toe 1.70.

#### SUBGENUS *Mareca*.

*Anas Americana*—BALD-PATE, AMERICAN WIDGEON.—Habitat.—North America at large, south to West India Islands and Central America. The first issue of this handsome duck in the spring occurs long after the ice has disappeared and about the same time that the bluebills appear. They soon pass on to the north and the second issue follows in a few days, which stay longer, traveling up to the lower and middle parts of

British America. The third issue hangs around a long time, and drifts off to breed within our borders. The first issue of the bald-pates in the fall comes down with the pintails, most of which are hatched within or upon our borders, or as far north as Lake Winnipeg; they are not in full plumage then, for it is about the end of September or thereabouts. The second issue follows early in October, in a rather less scattered condition, there are less pintails, but more gray ducks are to be found with them. The last issue comes down after cold weather has occurred in the north, and quickly draws close to the frost line.

Their feeding grounds are in bays, inlets, deep lakes and sloughs in the spring; whereas during the fall they assemble in shallower water, feeding more upon seeds than the bulbs which formed their spring food. Their roosting grounds are in quiet places inshore, down rice, bays and near smartweed and brush. Their playgrounds in the spring are in clear ponds (where their greenish heads and white wing bars show in bold relief), lakes and large sheets of open water. In the fall they use open holes in down rice, lily pads, smartweed, rushes, bays and sloughs.

Their food, see chart.

Their cry is a whistle, something like the last note of a Bartramian sandpiper or field plover. They are a shy bird on the coast, but not nearly so in the interior; easy to kill, but dive with great quickness when winged. Their clutch is from six to ten creamy colored eggs.

On the seaboard they follow the canvas-backs and redheads over the celery beds, stealing what they can

from these divers as they rise to the surface; not being content with the little shoots broken off below, which rise to the top and float around them. However, most birds will steal more or less, and the canvas-backs and redheads get paid back for stealing from the scaups, who are even better divers in searching for food than themselves. Length 21; wing 10.75; tarsus 1.50; extent 30; middle toe 1.75.

## CHAPTER V.

### DIVERS—COLD-WEATHER DIVERS.

A diver, properly speaking, dives for its food, and is able to stay below the surface of the water for some time whilst engaged in tearing rootlets, bulbs and seeds, from a lake or river's bottom. The reasons assumed are that, owing to the cavities of the divers' bones and quills being larger than in the non-divers, they are not compelled to breathe so frequently; their feet are larger, and the abundance of down upon their bodies resists the soaking of their feathers. When wounded they quickly dive, and in clear water they can frequently be observed swimming rapidly close to the bottom for a considerable distance; then rise under the friendly shelter of some bunches of flags, rushes, moss or lily pads, where unseen they can protrude their bills for air.

They usually feed in deep water, not infrequently drifting into the shores where food is plentiful. Their feet are broader, larger and more fully webbed, including the hind toe, *tarsi* shorter, wings, quills and tail shorter (except the harlequin, ruddy, old squaw, etc.), the tail contains more feathers, sternum shorter and broader, clavicle wider and the legs are set farther back upon the body. They waddle more, and frequent the land less than the non-divers. They call less whilst on the wing, and each species has a differ-

ent note. The sexes differ in color, but in the fall months the color approaches that of the young.

They also can be divided into warm and cold weather birds, of which we have more cold than warm; and we find the ruddy the tenderest of all. Many species are entirely northern birds, occupying our coast or large northern lakes; occurring as stragglers in the interior, upon our large rivers and lakes in the South, being driven down by rough weather especially when an early winter occurs in the North.

Unlike the non-divers, they are not all fit for the table; although some, like the canvas-backs, redheads and scaups, are in the first rank, the majority are fishy or totally unfit for food. They are harder to kill than the non-divers, also to gather when wounded; they fly lower, have more of a tendency to pitch in to decoys, or dip, pass on, turn and come back instead of circling, and are much tamer when not shot at too much.

GENUS *Aythya*—SUBGENUS *Aristonetta*.

*Aythya Vallisneria*—CANVAS-BACK.—Habitat.—Pacific Coast, north to Alaska; Atlantic Coast, northern part of South America, West Indies and British Possessions; through interior of the United States, breeding in northern portions. The first spring flight of the canvas-backs appears above the frost line whilst ice still remains upon the lakes; it stays but a brief period before passing northward, working its way to the British Possessions, the winter in the North regulating its flight, for this issue travels as far north as the breeding grounds extend. The second follows

about the time the ice is leaving and travels like the first issue, nesting in the interior around Hudson Bay and south of Great Slave Lake to Saskatchewan about its northern parallel. The third issue arrives after the ice has entirely gone, pairing about at  $44^{\circ}$ , and breeds from about  $46^{\circ}$  to  $55^{\circ}$ .

The first fall issue is composed of birds hatched near the Canadian border, which collect upon the lakes and leave for the South during the month of August, slowly working their way to favorite feeding grounds. The second comes from above the line, taking to a great extent the others' places. The third generally comes down with a rush, staying until driven south by ice and snow. They do not seem to like icy lakes in the fall so much as in the spring.

Their favorite feeding grounds in the North of the United States are upon the lakes of North and South Dakota, Minnesota and Wisconsin; Iowa and Nebraska in former years attracted them, but many feedings grounds there are nearly or entirely neglected. Upon the seaboard of the Atlantic, the Chesapeake Bay throughout its entire length, with the sounds and bays of the Carolinas, the coast of Florida and the Gulf of Mexico afford fine feeding grounds more or less every year; whilst the Pacific Coast is more variable and less productive of food. They feed in deep water as well as water of a moderate depth, owing to their diving propensities, like the redheads and scaups; wild celery, the bulbs of artichokes, potatoes and non-scented water lily, together with the lotus, are favorite foods

Their playgrounds are in open sheets of water in

lakes, rivers, deep sloughs, bays, etc., where they pack together and float upon the surface, their red heads forming quite a contrast with their white brown-mottled backs. They associate with redheads, scaups and widgeons or bald-pates, especially upon the sea-coasts. Their roosting grounds are in open water, holes in lakes or sloughs covered with lily or lotus pads; on sandbars of rivers and on wide open water surrounded by flags or brush. The principal nesting grounds are between 50° and 60°, although they breed from 45° north.

Their flesh, after eating vallisneria or wild celery, especially upon the Atlantic Coast, is excellent; less so in the interior, and still worse on the Pacific, owing to the lack of celery. I have known the market price in Boston to be as high as eighteen dollars per dozen; the highest price attained by any of our ducks.

The canvas-backs are splendid divers, superior to the redhead, although the scaups come next if not equal to them; all having the ability to dive to the bottom and tear up the shoots and tender rootlets as well as the bulbs of their favorite foods. They are prairie birds, although they use the heavy timber, lakes and brushy deep ponds. Their call is a cōō-ōō-ēē. They are hard to kill or gather when wounded, but decoy easily and are frequently extremely tame.

For nesting and food, see chart.

They are readily distinguished from redheads by their beveled black bill, large feet and size. A prime canvas-back weighs three pounds; whilst a redhead weighs only about two and one-half, has a leaden-colored bill, not beveled, but shaped like that of a

scaup, black-tipped, with yellow eyes; whereas the canvas-back has red eyes. Its clutch is from eight to ten creamy white eggs. Length 22; wing 9.20; tarsus 1.70; extent 33.00; middle toe 2.30.

GENUS *Aythya*—SUBGENUS *Aythya*.

*Aythya Americana*—REDHEAD, Pochard.—Habitat.—From the Atlantic to the Pacific, north to British America, south to the West Indies and Central America. The first spring flight of this well-known duck passes the frost line whilst the ice still remains upon our lakes, water only existing in open holes or channels; the birds follow closely after the canvas-back and like that bird appear in good-sized flocks. They decoy readily to any open water, but are much easier to kill or catch when winged. They stay but a short time, working rapidly toward the north and going to the far end of the British Possessions. The second issue arrives about a week after the first has departed, if abundance of food be present; they stay until the advent of the third issue, then travel north also beyond the boundary line. The third begins to pair upon reaching latitude 44° and spreads all over the country up to Manitoba.

The first fall issue leaves the northern part of the United States shortly after the canvas-backs, following them to the celery beds; but are not so particular or choice in their food, for any kind of bulb or root which shows green shoots upon the bottom seems to be relished, whereby they can very properly be termed the hogs amongst the divers, never seeming to be tired of glutting themselves, and soon render the green

bottoms bare of vegetation, thereby destroying what fine flavor they might have obtained from the celery beds if they had been more abstemious in their feeding. The second issue comes from the middle of the British Possessions about September, gradually working downward, both interior and coastwise. The third comes down full feathered, like the second, generally with a rush, frequently mixing with bluebills in the same manner that they mix with canvas-backs in the spring.

They feed on open lakes, both shallow and deep, if food be present; they also like to drift into the timber, where pin oak mast abounds, especially as they approach the South. Upon the coasts they drift into bays and inlets and feed near the shore. Their playgrounds are in open water upon large lakes, or some distance from the shore on the coasts, where they float about in rafts or flocks. They are easily lured to shore by tolling, either by a red handkerchief raised and lowered, or by some odd moving object, for they are most inquisitive birds; sometimes, a dog is trained to run along the shore and bark at the water's edge, the gunner lying concealed close by; even after being shot at, they soon seem to forget the occurrence and gradually work in again to the object which had previously attracted them. Should, however, a few bald-pates be mixed up with them, these soon spoil the game; being more suspicious, the bald-pates will keep turning and swimming back without approaching within shot, drawing the redheads with them. Even upon a flight, the bald-pates lead many flocks of redheads away out of shot by their shying away from any

object which they distrust and which the redheads would have unhesitatingly approached.

The redheads' cry whilst floating about in compact bunches resembles the mewing or cry of a cat, but their call is a very modest quack. They roost upon the open water, feeding through the night; in fact, they always appear hungry.

For food and nesting range, see chart.

Their clutch is from eight to ten creamy white eggs. They are both prairie and timber birds. Like the canvas-backs, they fly at a high rate of speed. The female, which closely resembles a bluebill duck in color, is easily told by its size of foot, from the latter; and from a canvas-back by its bill not being beveled, and blue-black tipped instead of black. Length 21.00; wing 9.00; tarsus 1.60; extent 31.50; middle toe 2.30.

GENUS *Aythya*—SUBGENUS *Fuligula*.

*Aythya Collaris*—RINGBILL, RINGNECK, BLACKJACK. Habitat.—North America at large, north to British America, south to Central America and West Indies. In the spring migration this duck appears during the first issue, when open water is to be found in channels; or where the north side of the arms of lakes and inlets thaw out first by the rays of the sun. The ducks proceed northward as the open water appears, using to a great extent the grounds of the bluebill. The second issue stays the longest of the three, and affords flight or pass shooting unequalled by any other diver. It does not tear up the celery beds like *marila* or *affinis*, although it indulges somewhat when it can find it; but

owing to its feeding range being in shallower water, it often misses it. The third issue soon scatters after its arrival and breeds through the United States.

The feeding grounds are more inshore than those of the bluebills, and they feed more upon seeds such as frogbit, duck and pond weed, being very fond of the bulbs of the non-scented water lily, upon which they will gorge themselves and get exceedingly fat; at that time they are counted a delicacy for the table. The playgrounds are in open pieces of water surrounded by weeds and lily pads, in buck-brush, willows and wild rice. The roosting grounds are in buck-brush, the edges of timber, down smartweed and flags.

During the fall migration, the local birds form the first issue, and the second and third come down earlier than the bluebills; so that cold weather finds them rapidly approaching the frost line. Here is another example of a cold-weather bird, in the spring, moving southward before others who are warm-weather birds; as the pintail of the non-divers. They are both timber and prairie birds, according to location.

For food, see chart.

Their clutch is twelve to sixteen white-colored eggs, often with a greenish cast. Length 18.00; wing 8.00; tarsus 1.40; extent 27.00; middle toe 2.15.

#### GENUS *Glaucionetta*.

*Glaucionetta clangula Americana*—AMERICAN WHISTLE-WING, GOLDEN-EYE.—Habitat.—Atlantic and Pacific coasts, Lake region north to British America, south to the Gulf states and Caribbean Sea; also through the interior down the Great Red River of the North, the Missouri, the Mississippi and their tributaries.

The first issue in the spring occurs when winter is relaxing its grip, and is commonly dispersed along both coasts, sometimes appearing in large numbers, but generally scattered; especially is this the case during the late issues.

During the fall migration they appear more in the interior, following the large rivers and down the lakes and rivers to the Gulf of Mexico, but do not appear in flocks as they do coastwise.

They like to drift inshore to feed in the bays and estuaries, on both deep and shallow lakes, especially the shallow ones surrounded by timber and buckbrush; they like mud flats near wide rivers, so frequently are found in the South. Amongst aquatic plants, every other year is a flower season with few bulbs, followed by a bulb year with few flowers; hence some years these ducks appear upon a few particular lakes, during others they are found scattered over a good many.

They nest, like hooded mergansers and woodducks, in holes in trees; but often choose other sites in unfrequented places. Like the surf coots their flesh is fishy in the spring, but in the fall they are fair eating. Length 19.50; wing 9.00; tarsus 1.50; extent 30.00; middle toe 2.50.

#### GENUS *Glaucionetta*.

*Glaucionetta islandica*—BARROW'S GOLDEN-EYE, GARROT, WHISTLE-WING.—Habitat,—Atlantic and Pacific coasts northward; Alaska, south to 44°.

Rare in the interior, except the Northwest and Northeast; a few come down to Rainy River over the

Lake of the Woods, thence to Leech, Cass and Red lakes, etc.; also from Lake Winnipeg down the Great Red River of the North; rare south of Southern Minnesota.

They associate with the harlequin duck among the rapids; and are like *G. clangula*, expert divers; almost impossible to catch when wounded.

They nest, like *clangula*, in holes and rocky places, and their general habits appear the same. Length 22.00; wing 9.50; tarsus 1.60; extent 31.00; middle toe 2.50.

#### GENUS *Histrionicus*.

*Histrionicus histrionicus*—HARLEQUIN DUCK.—Habitat.—British North America, coastwise; rare in the interior, except in the Rocky and Sierra Nevada mountains, where rapids abound.

This little duck, named from its fantastic and clown-like habits and coloration, is of irregular distribution; chiefly found in the interior, in the whirl of the rapids as much as the eddies; no water appears too rough or too rapid for it, and it seems to live more under water than upon the top. It comes south as far as Rainy River, hanging around the rapids near the lake; but few are seen together, generally one. They nest like *G. clangula* preferring isolated places.

Little is known of this duck in the interior, owing to its retired habits in almost inaccessible places. Length 17.00; wing 7.50; tarsus 1.50; extent 26.00; middle toe 2.00.

## GENUS MERGANSER.

MERGANSER *Americanus* — AMERICAN MERGANSER, SHELLDRAKE, FISHDUCK.—Habitat.—Both coasts and interior of North America at large; south to Gulf of Mexico and West India Islands. When the first glimpse of water can be seen in the shape of narrow channels upon the large waterways above the frost line, the fishduck or shelldrake, as he is locally called, puts in an appearance, and fights his way northward ahead of any other bird. The second and third issues follow, a few days existing between each flight. They seem to enjoy frozen, rotten fish with the same gusto as fresh, picking them out of the floating ice. During the fall flight they pass over at night, always following the large streams and rivers, coming down late in the season, for few breed on this side the boundary line.

Their feeding grounds are on large streams, and they display a great deal of sagacity when feeding in flocks. Forming a half-moon, keeping well together, after the appearance of the corks of a seine, they slowly drive, by repeated diving, the fish to a shallow place or bank, where, still keeping the half circle, they dive and catch the fishes as they reach the shallows; having once got the fish into shallow water, where they ripple the surface, the ducks rush in and rapidly devour fishes of a large size. Their roosting grounds are in lakes and rivers, preferring open water. Their playing grounds are in open water, floating about, generally after a heavy feed.

Their clutch is from eight to ten yellowish-white eggs. Length 26.00 to 27.00; wing 11.00; tarsus 1.90; extent 36.00; middle toe 2.20.

## GENUS MERGANSER.

MERGANSER *serrator*—RED-BREASTED MERGANSER.—Habitat.—Northern North America, coastwise, and the Great Lakes; south to Gulf of Mexico, those of the interior following the Mississippi. This duck closely follows the shelldrake during both migrations, feeds upon the same food and inhabits grounds in a like manner.

Its clutch is about eight dirty greenish-white eggs, and it builds a clumsy nest on the ground, in the interior of which finer material is used, lined with feathers; whereas the shelldrake often builds in low branches of trees, on rocks, etc., at the water's edge, making a less rude nest. Length 23.50; wing 8.80; tarsus 1.90; extent 30.00; middle toe 2.00.

GENUS *Lophodytes*.

*Lophodytes cucullatus*—HOODED MERGANSER.—Habitat.—North America at large, coastwise and interior; south to the Rio Grande, Mexico and Central America. This handsome diver, the male adorned with an elegant black and white topee, contrasting with the flimsy headdress of the female, passes over the frost line before the ice has disappeared from our large lakes and streams. It stays but a brief period, following up the high spring water, working its way rapidly to the British Possessions. The second soon follows, which passes on to the Canadian boundary and northern states. The third stays with us and scatters over the country after the manner of the wood-duck and bluewinged teal of the non-divers, and breeds in most of the states; thus, with the southern

birds which do not join the flights, making it one of the widest breeders of the duck family.

It is a timber bird, frequenting wood-lined streams and lakes; in the South it frequently raises two broods during the season, nesting like the woodducks and whistlers in hollow trees rocks etc., near the water. It feeds in the running streams, on lakes, bayous and ponds. The playing and roosting grounds are in the bushy edges of lakes, rivers and ponds, bayous, etc.

The clutch is from eight to twelve white eggs, sometimes blotched with brown. Length 18.00; wing 7.50; tarsus 1.25; extent 25.00; middle toe 1.85.

*Genus Somateria*—SUBGENUS *Somateria*.

*Somateria dresseri*—AMERICAN EIDER.—Habitat.—Atlantic Coast, northward from Maine to farthest islands; south to 42° in winter, occasionally.

Little is known in the interior of this valuable duck, which differs slightly from the eider duck common in Iceland and on the Arctic shores, where its down with that of *Clangula hyemalis* forms a regular source of commerce with the inhabitants. The quantity of down in one nest is said to weigh about half a pound, which is, however, reduced to four ounces in the process of cleaning. The down taken from the nest, plucked by the duck from her own breast, is much superior to that taken from a dead body. It is said that the drake furnishes a second supply if the nest be robbed and the duck is unable to afford it, easily recognized by being whiter than that from the duck. They build on small islands rather than on large ones or the mainland, which affords better security from the intrusion

of animals, whose presence they shun. The Icelanders, knowing this, often separate a peninsula from the mainland, and even cut islands where the ducks can easily be separated, and thus keep them free from disturbance, frequently cutting holes in shelving banks for the accommodation of their nests (vide "Hooker's Tour of Iceland"). They build their nests in sloping banks, depressions and crevices between rocks, etc., under juniper bushes and overhanging tufts of seaweed.

Their clutch is from four to six greenish-colored eggs. It is the largest duck we have, frequently being seven pounds in weight. Length 24.00; wing 11.00; tarsus 1.90; extent 38.00; middle toe 2.25.

GENUS *Ædemia*—SUBGENUS *Pelionetta*.

*Ædemia perspicillata*—SURF SCOTER.—Habitat.—Both Atlantic and Pacific coasts, the Great Lakes and large inland rivers, north to Alaska and extreme North America; south to 38°; sometimes quite common upon our large lakes in mild winters; often called skunk coot, sea coot, etc. During the spring and late fall it may be observed on Lake of the Woods, Red and Leech lakes, down to Lake Michigan; often common on Lake Winnipeg and the Great Red River of the North; large flocks, however, are rarely seen south of the 46° parallel.

It feeds on shellfish, especially mussels, crayfish and fish spawn; besides a few bulbs of aquatic plants. The playground appears to be riding on the waves, mixed with other scoters and old-wives. It roosts on the open water, far out from land, working in during the

early morning to feed. It is distinguished from the other scoters by its forehead, line under the eye and nape white, feet orange red, and iris yellow. Length 19.00; wing 9.80; tarsus 1.80; extent 31.00; middle toe 2.25.

GENUS *Ædemia*—SUBGENUS *Ædemia*.

*Ædemia americanus*—BLACK SCOTER.—Habitat.—Both Atlantic and Pacific coasts; the Great Lakes; north through British America; south to the Ohio, Missouri and Mississippi rivers. Rather more common than the other scoters in the interior, although all are represented upon the great lakes of British America. The Lake of the Woods, Red, Leech and Cass lakes contain them nearly every year during the fall; sometimes all the scoters appear well represented, other years but few are to be seen, when they are commonly called sea coots.

They feed upon nearly the same food, and the general habits of one will usually conform to those of the others. They are easily distinguished from the other scoters, from having no white on the body or head, feet dark, and iris brown. Length 20.00; wing 9.00; tarsus 1.80; extent 32.00; middle toe 2.65.

GENUS *Ædemia*—SUBGENUS *Melanetta*.

*Ædemia deglandi*—WHITE-WINGED SCOTER, VELVET SCOTER, SEA COOT, SURF DUCK.—Habitat.—Both coasts of Northern North America; Great Lakes; but more coastwise than *O. americanus*. On Lake Winipeg and surrounding lakes it is frequently seen in company with both *O. americanus* and *O. perspicil-*

*lata*, its white spots showing plainly as it rides the waves or rises to the surface from diving, contrasting with *O. americanus*; but, if far out from shore, the white upper wing coverts are hardly distinguishable from *O. perspicillata*'s striped, skunk-like head.

They wander down the Mississippi and have been killed on Big Lake, above Grand Tower, at New Madrid, on the Missouri side, and at Reelfoot Lake, Tennessee, in the fall. It is most common on the sea-coasts, drifting inshore to feed in the bays, and floating outside with other divers. It feeds upon the same kinds of food as the other scoters.

The principal distinguishing features are, beneath the eye, secondaries and upper wing coverts white; feet scarlet, iris yellowish white. Length 22.00; wing 11.75; tarsus 2.00; extent 34.00; middle toe 2.85.

#### GENUS *Clangula*.

*Clangula hyemalis*—OLD-SQUAW, OLD-WIFE.—Habitat.—British North America, to extreme north and islands beyond; south down both coasts; occasionally the interior, through the chain of lakes, Mississippi River, to the Gulf of Mexico. This handsome duck, with a long tail in the male in full plumage, answers to the names of long-tailed duck, old-squaw, old-wife, south-south-southerly, old scold and swallow-tailed duck. It is an irregular visitant during some winters through the interior. It may be met with on the Missouri, Mississippi and the Great Red River of the North during the late fall; on the chain of lakes forming Winnipeg Lake in Manitoba and Saskatchewan, on the Lake of the Woods and Rainy River, lakes

Erie, Michigan and Superior, where surf coots abound, but is most common on the Atlantic Coast.

Its down is as much an article of commerce as that of the eider, but is not so plentiful; nor is there so large a quantity in the nest. Before rough weather they fly over the lakes, uttering the cry of "sou-sou-southerly," but when collected and quiet upon the water they give vent to a gabbling cry more like a lot of scolding women; it is from these cries they get their numerous names. They nest in holes and depressions on the islands in the far north, Iceland and Newfoundland, preferring small to large islands on the mainland.

Their clutch is eight to ten greenish eggs. Length variable, according to development of tail, 15 to 22.00; wing 9.00; tarsus 1.40; extent 30.00; middle toe 1.90.

## CHAPTER VI.

### WARM-WEATHER DIVERS.

#### GENUS *Aythya*—SUBGENUS *Fuligula*.

*Aythya marila*—BLUEBILL, BLACKHEAD, RAFT OR FLOATING DUCK, SCAUP DUCK.—Habitat.—North America, from ocean to ocean; north through British America; south to West India Islands and Central America. The principal flights through the interior are up the Mississippi, Missouri, Canadian and Ohio rivers, branching from the former over the Fox Lake region and northern lakes of Illinois northward.

The first issue stays but a short time, soon passing northward as fast as the ice disappears, for they rarely leave the frost line until the ice has departed, working up in the interior, through the lakes and overflowed bottoms below St. Louis, following behind the ring-bills. Some years they arrive in great numbers, while at other seasons they are very few. They prefer still to running water; naturally, large ponds and lakes, bayous, bays and inlets are their favorite resorts. They do not mix much with either *Affinis* or *Collaris*, preferring their own species. Many birds are killed whose measurements are below their standard, but not reaching the small size of *Affinis*; whether they interbreed in their northern homes remains a question, for both *Marila* and *Affinis* use the same northern nesting grounds. The second issue arrives a few days after the main body of the first has departed, and stays a

longer time, giving way to the third issue, which breeds in the United States and southern Canadian border.

During the fall migration the first issue is from the birds raised from the third spring issue, and they are not yet full feathered. They travel slowly down to the frost line and are overtaken by the second issue, which arrives when the first real cold snap occurs in the extreme north. The third issue rushes down as the wintery storms reach them in the United States, staying as long as any open water is to be found; remaining for several weeks in the south lakes of Illinois, Missouri and on the Mississippi borders.

Their feeding grounds are upon still lakes, ponds, sloughs and musquaides, bayous, inlets and bays of the seacoast and large rivers. Their playgrounds are in open water or open places in lilies, lotus, etc., large ponds, lakes and rivers; sometimes on sandbars on rivers, where they pack together and float upon the surface during the middle of the day, basking in the sun. Hence they obtain the name of raft ducks, or flocking fowl; even in rough weather they may be observed floating over the choppy waves on our numerous lakes. Their roosting grounds are in open water holes surrounded by various aquatic plants, on the bushy shores of lakes, bays, bayous, etc. Their nesting grounds are in flags, canes, rushes, heavy grass, bunches of willows, buck-brush and wild rice. Their call is a pu-r-r pu-r-r, with the accent on the p continued on the r.

For food, see chart.

They are both prairie and timber birds, liking wide

arms or inlets running into the timber, covered with buck-brush or surrounded by it, so commonly found in the South. Their clutch is from eight to ten dirty white eggs, often blotched or streaked with yellowish brown. Length 18.20; wing 9.00; tarsus 1.60; extent 32.00; middle toe 2.30.

GENUS *Aythya*—SUBGENUS *Fuligula*.

*Aythya affinis*—LITTLE BLUEBILL, BLACKHEAD, SCAUP.  
—Habitat.—Atlantic to Pacific coasts; rare in the interior, except the lake region; north to British America and islands beyond; south to South America and West Indies. The migrations of this our smaller bluebill are, as nearly as can be ascertained, a counterpart of *A. Marila*, except it is more of a coast duck and less of an interior bird up to the 44° parallel. It becomes more abundant upon the north lakes, some years common, others more scattered. It keeps to its own species, inhabits the same grounds, feeds on the same food, and is as fond of wild celery as *Marila*, being very destructive to the beds. It breeds outside of the United States and in the fall migration comes down late in two issues.

Its clutch is from ten to fourteen dirty white eggs, with less markings, but in all other respects the history of one is nearly a repetition of that of the other. Length 15.00 to 16.00; wing 7.75; tarsus 1.20; extent 26.00; middle toe 2.10.

GENUS *Erismatura*.

*Erismatura rubida*—RUDDY DUCK.—Habitat.—North America at large; south to Central America

and the Caribbean Sea; West Indies, especially Florida Coast and Jamaica in winter. The first issue of these odd, bull-necked looking ducks occurs after the winter has entirely broken up and the ice has gone. They are rarely seen during their migrations, traveling by night. Two issues are fairly well recognized. The third is scattering; some years they appear in numbers, at other times are very scarce. Their flyways are (in the interior) up the Mississippi and its tributaries. During the fall migration they leave the boundary line in September, and the flight is composed of the second issue of the spring, the first fall issue being composed of local birds, for they breed all over the United States. The last fall issue is from northern birds not hatched in the United States. They also migrate at night, suddenly appearing upon new grounds.

Their feeding grounds are in the heavy weeds, and around the banks of ponds or lakes where they breed. Their roosting and play grounds are upon the same piece of water, generally roosting in the weeds and playing in the open places.

Their food, the chart shows.

During their winter sojourn South, they often collect in large flocks, especially in Florida and on the Rio Grande River; the tame rice fields in the extreme south are very favorite haunts for the paddy duck, the name it is locally called.

Its clutch is from eight to ten large rough-shelled eggs of a dirty white color. Length 15.00; wing 5.80; tarsus 1.25; extent 24.00; middle toe 1.75.

GENUS *Charitonetta*.

*Charitonetta albeola*—BUFFLE-HEAD, BUTTER-BALL.—  
Habitat.—United States, north to the British Possessions; south to the Gulf, West Indies and Mexico. The smallest of our ducks, especially so of the female, an insignificant looking bird compared with the drake, who ranks with our handsome ducks.

The first issue of these birds appears in the interior above the frost line late in the spring, a short time before the bluewinged teals arrive; and with the ruddy ducks are the last of divers to travel northward. They soon depart to the far north, where they are followed by the second and third issues, which scatter over the country before they also follow the advanced flight.

They are tame birds, allowing the hunter to walk or push up very close to them; preferring to swim from danger rather than fly, diving as they go. In the fall they pass through the interior in large flocks, keeping to open water upon large lakes; not being so commonly dispersed over the country as in the spring.

For food and nesting, see chart.

Their clutch is from ten to twelve white, speckled slightly with brown, eggs. They vary in size more than any other ducks, except *Affinis* and *Marila* of the scaups. Length 13 to 15.00; wing 6.60; tarsus 1.20; extent 20 to 21.00; middle toe 1.70.

## CHAPTER VII.

### INSTINCT VERSUS REASON.

Judging from the wonderful strides science has taken during the past twenty-two years, its progress has greatly exceeded that of the prior seventy-six years of this present century. We view with wonder akin to awe what once seemed to be insane and vague ideas, or delusions, now modeled, improved, used and adopted by all nations for profit, comfort and luxury; while electricity, machinery, art, music, drawing and the schools of painting, medicine; surgery, dentistry, photography, etc., seem to overshadow all. Yet, we must not lose sight of the perfection with which guns, ammunition, combustibles (especially wood and nitro compounds), decoys and other devices have kept pace with the foremost, and scattered broadcast their destructive propensities.

Why wonder that the countless flocks of ducks and geese, surrounded upon all sides by improved weapons, which belch forth death and destruction upon them, should have their ranks decimated, their flights changed, their old landmarks removed or destroyed, their feeding, roosting, nesting and play grounds devastated; and what remains of that vast and fluttering cloud of wings we may assume to be most truly the "survival of the fittest?"

Is it not possible (aided by a peculiar and unknown quantity which lies in that wonderful and magic circle

which the Almighty alone can describe, in which none can tell where instinct ends and reason begins), they may have advanced and cultivated their instinctive reasoning powers to such an extent that they are now able to cope, and to protect themselves more successfully against all the innovations of destruction?

Does not the hereditary law plainly show, to an expert, the slightest mule strain lurking in the progeny of a mare whose dam or grandam had foaled a mule? Does not the breeder of horses, cattle, hogs, dogs, or what not, endeavor with painstaking efforts to obtain the strain he desires for speed, nose, color, style, cleanness of limb, etc., as pure and as nearly perfect as possible, because the attributes of bygone strains are reproduced in coming generations?

Conversely, if migratory birds by their innate instinctive propensities return year after year to favorite haunts, and nest in the same places, if found in former conditions, should not the ducks, by virtue of instinct, reason, intelligence or sagacity, call it what you will, grow wiser and more cautious from the continual harassing they have endured for so many years, and by that great law of inheritance imbue in their offspring those traits and characters which are so often seen depicted in generations of men and domestic animals?

That ducks can talk and convey to each other warnings and greetings is a well established fact, and numerous are the accounts in which a bird beset by danger by its cries will summon others of its species to its assistance. If geese, rooks and wood pigeons, of their own sagacity, post sentinels on the highest peaks of some observatory points, which allow them to see

from a greater distance the approach of danger, wherefrom in clanging notes they apprise the feeding flocks of coming foes, should not ducks become more educated, enlightened and better able to shun and escape lurking danger, the rudiments and practical knowledge of which, driven into the minds and brains of their ancestors, are inculcated in their own brains; keeping in view the fact that some ducks, like various animals, are more sagacious and wary than others? Will they not shy from the report of a gun, from a flash of fire before sunrise or after sundown? From a sudden movement in some innocent-looking blind? From the glitter of a gun barrel glancing in the bright sunlight, or from a flock of motionless decoys, having learned from bitter experience that danger lurks therein? Is it not possible that wounded birds can make their grievances plainly known to their more fortunate companions, who, scared but not hurt, although possibly scratched, escaped from the spot to which they had been decoyed and where their unlucky companions were injured? If ducks could not discriminate between decoys and natural birds, and recognize them to be shams and frauds, why do dealers vie with each other to make them more natural, even to perfect coloration?

A wounded diver darts below the surface and propelled by its feet glides away close to the bottom. A wounded non-diver flutters out upon the water, or sinks below the surface, where it quickly conceals its bill, whilst obtaining air, under a tuft of weeds or a lily pad. A quail or plover flutters in the path before you, or a warbler flits from spray to spray, each endeavoring to lead your footsteps far from her nest.

Who shall say this is instinct? Who shall say it is not reason? May it not be a combination of both, strengthened and inculcated by hereditary laws?

Again! who can explain the reason why ducks can tell to a certainty what species or kind of hawk is rapidly approaching? How do they know the species that will catch them on the water, the kind that will chase them only on the wing, or those which will do both? If the first, they will fly around him or away; in the second, they will run along the water and dive as he dips at them, anything but fly; whereas, in the latter, they will dive or fly out of the way, hurrying to seek cover to hide in. Art must be met by art! Fraud by experience drawn from reasoning! And that rare presence of mind used to avert danger in moments of extreme peril, which has been engrafted in our brains from past experiences, either of ourselves or others, emanates by a flash from the brain and is instantaneously acted upon. Why not so with the duck family, even if in minor proportions, driven, harassed and wounded upon all sides, day by day, night by night, month after month, until they find no rest for the soles of their feet from north to south and east to west? Would they not naturally increase their cautious, observing powers on approaching anything uncanny, or capable of exciting the least suspicion; their education being acquired by force of circumstances? Why should not the whole family of game birds to a great extent become as enlightened in self-preservation as we? They from instinct verging into reason, we from reasoning backed up by experience and experiments? Instinct is a natural attribute; reason is the offspring of experience.

## CHAPTER VIII.

### ADAPTATION OF FOODS TO SOIL, DEPTH OF WATER, ETC.

As states and territories become settled more every year by the steady influx of emigration, more land is reclaimed from their water-ways which naturally advances in value as the surrounding country grows productive. Improvements constantly take place, especially drainage by tiling, open ditches, etc. These necessitate outlets, and canals are cut and dredged to convey the water to the nearest creeks and streams. Hence a slough or marsh is rapidly drained, the level of the water is lowered and dry and marshy land appears containing shallow ponds, scattered here and there, marking the low depressions. A dry season arrives, more land is broken by the plow and reclaimed and forest trees are cut from the banks of the streams. All these concomitants of progressive civilization lessen the area of the waters of the state, and tend to divert the flyways of the various ducks to other favorite and undisturbed grounds.

The gradual withdrawal of the water, either entirely or by lessening its depth exposes more or less of the ducks' food supply, which may be killed by dryness and scorching from the sun's hot summer rays, by plowing up both food and cover, or by rendering the water too shallow for those aquatic plants which are partially or totally submerged.

The divers take the initial step, for they will not remain around shallow water; even if a few deep ponds or lakes remain and still retain some of their favorite food, it is generally insufficient for their respective wants. In former days the water may have been too deep for their food to grow in, and although the water has probably fallen to a proper depth, the food germs, rootlets, bulbs, etc., may not be there owing to the soil not being adapted to their growth. Many fine pieces of water can be found where ducks may constantly be observed flying over, skimming the surface or occasionally alighting during the day, still they do not evince any disposition to stay owing to the fact there is very little food to be found, or, possibly, none at all. The reason may be a bare clayey or stony bottom, that would interfere with food growth; or, perhaps, if the conditions should be favorable in having gravel, mud or other suitable bottom, which soil could and would produce a fine harvest of duck food acceptable to both divers and non-divers according to its depth, alas! the seed roots, bulbs and germs are wanting. Possibly the surrounding banks are devoid of canes, rushes, wild rice or barley, or the common crop of grasses and sedge which usually fringes such places is absent—destroyed by dryness of the banks, prairie fires or the plow—and what was once a favorite spot has become barren through the march of civilization.

The non-divers remain the longer of the two, especially the bluewinged teals, spoonbills, green-winged, with the mallards and pintails, especially if there are plenty of grain or corn fields in the vicinity;

but they soon diminish in numbers and drift off to other more congenial feeding grounds, whose richness speedily attracts them.

Always try to get the three principal grounds, viz., roosting, playing and feeding. If all are not obtainable, try a feeding and roosting, or a play and a feeding ground, taking care that they lie far enough apart that the shooting near one ground will not scare the birds or conflict with the requirements of the other. The proper distance is between half or three-quarters of a mile, more or less, as the area of the water provides; possibly some arms of the lake or slough, hidden from view by a heavy growth of rice or canes, might be conducive to good results. Ascertain whether divers or non-divers could feed on any of the various parts; possibly both might be accommodated. Examine the bottom of the lake carefully, both in deep and shallow water, to find if the soil would be adapted to the particular bulb, root, plant or seed you wish to sow or plant, which would prove alluring to the kind of ducks you seek to attract.

Attention should be given to the sowing or planting of the edges of ditches, channels and the margins of all lakes or sloughs, ponds, etc., with a growth of rushes, cattails, horsetails, wild rice and barley, reeds, canes, etc., not only for cover, but to protect the birds from heavy winds and storms which invariably drive ducks from open water to seek shelter. Wild rice makes an excellent cover, beside affording the blossom, which is eagerly sought by the woodduck, as well as the seeds; the roots also form a mat where moss can obtain a foothold and attract Wilson's snipes

and Carolina rails. The grass and sedge family contribute a goodly share to cover, and many birds are tempted to drop in to find a roosting place. All kinds of water lilies—white, yellow and red—form excellent shelter in open water; nearly all ducks like to drift among them when found near their playgrounds, especially in windy and rough weather.

The various species of frogbit, duck and pond weed are peculiarly adapted to slow waters, as lakes, sloughs and ponds, entrances of channels, ditches where shallow water abounds, for many of them are partly or entirely submerged; they grow best in a dark, murky soil and spread rapidly where water exists all through the year.

The lay of the country, the position of the ground, the state they are in and many other surroundings have to be taken into consideration, all of which can be determined only by knowledge and experience of every duck and its habits, its food, which should be determined by dissection, together with an acquaintance of the peculiar growth, manner of planting and collecting of the various foods and the soils adapted to their growth and culture; a knowledge of which would amply repay all duck hunters, and, if applied, would render many grounds more attractive and induce the birds to return in greater numbers.

Probably one of the best examples of the effects of drainage, resulting from cultivation and settlement, can be found in the state of Illinois. During the early seventies the above state, with the adjoining one of Indiana, furnished the highways of all the large flights east of the Mississippi River, with the exception of

the coast. These may be divided into the Mississippi, Illinois and Wabash river flights, all of which diverged and spread over the entire state, both spring and fall, in every conceivable direction.

Taking the Mississippi River as the parent stem, with Cairo as the southernly point, one flight followed the Ohio River, increased by additions from the Cumberland and the Tennessee, until it reached Gallatin County, where the Wabash flight turned north up the river; this fed all the border line counties, over the Kankakee Marshes, Beaver Lake up to Wolf, Hyde and Calumet lakes, to Lake Michigan.

Passing Cairo the Mississippi flight extended over the big chain of lakes between Fountain Bluffs (or Hat Island) and the Big Muddy River, stretching far inward and up to Landing 45, up past Chester, swinging west round St. Louis to St. Charles Flats, over the swamps and sloughs upon the Carthage, Burlington & Quincy Railway, up to the Illinois River; then spreading over the northeast part of the state, passing into Wisconsin from the Winnebago swamps to the river westward.

The Illinois River flight commenced above St. Charles Flats, spreading all over the American Bottoms, working up over the lakes lying on both sides of the river until it reached Fox River, then over the Fox Lake Region north.

A large flight also existed, fed by the Wabash and Illinois River streams in the northeastern part of the state; passing over Champaign, McLean, Ford and Kankakee counties to the Vermilion Swamps lying between the Illinois Central and the Wabash railways.

These were the principal flights whence our ducks came.

About 1878, a narrow-gauge railroad was laid from Le Roy to West Lebanon, Indiana, directly across the above flyway. Canals were soon cut, the land ditched and drained into the Sangamon River, and in a few years the great flyway and stopping place of millions of non-divers was greatly disturbed. A few years later the great Vermilion Swamps, lying south of Milks Grove and north of Burr Oak, in Ford County, were ditched and drained into the Vermilion River. This still greater disturbance practically destroyed the entire flight.

About 1880, the building of the town of Pullman was commenced, and the shooting upon Calumet Lake and the marshes and sloughs from Irondale to George, Wolf, Hyde lakes, etc., was reduced to nothing.

About 1888, the large lakes upon the Mississippi, near Fountain Bluffs, Big, Swan, Mud, with Upper and Lower Little lakes, were drained and hundreds of miles of water, sloughs and glades were rendered almost duckless, where a few years before they swarmed in hundreds of thousands.

Again, the progressive ambition of shooters to own club houses, cottages, etc., on good shooting and fishing grounds, led them up the Fox Lake Region. The opening of the Wisconsin Central was the entrance of the wedge and after Lake Villa was built, followed by summer cottages on Fox, Marie, Bluff, and Channel lakes, the death knell of Grass Lake, one of the finest feeding, roosting and play grounds in the whole region, was sounded. Thus the glory of the shooting

throughout the state of Illinois, once teeming with wildfowl the roar of whose wings could be heard for miles, has gone into history as a thing of the past; the only shooting of any account being above the St. Charles Flats, north of St. Louis, between the Mississippi and the Illinois rivers, or along the border counties of the Wabash flight. Stopping spring shooting and propagating new or restoring old grounds in a similar manner to that the fish commissioners are now using afford the only remedies I can suggest to induce the birds to drop in, roost, feed or play a short time, instead of passing over. Cultivation, drainage, increase of population and railways have certainly been great agents in causing this sad duck loss; although, shooting before sunrise and after sunset, and long shots upon the hazard of chances have done their share in days past.

## CHAPTER IX.

### PROPAGATING NEW GROUNDS AND REPLENISHING OLD WITH SEEDS, BULBS, ROOTLETS AND FLOWERS.

It may be taken, as a general rule, that divers feed upon those aquatic plants whose seeds, roots and bulbs are entirely submerged; whereas, non-divers feed upon those which float upon the top or are only partially below the surface. This, however, is open to many exceptions, for the high or low state of the water governs to a great extent; for we frequently see non-divers feeding in the fall, when the water is low, in places they would avoid in the spring. Non-divers feed in shallow water inshore, upon the land in grain and corn fields. Naturally their food is more varied from the amount of grasses which abound there, whereas the divers rarely go ashore to feed far from the water's edge.

To procure the food for our divers involves much labor and experience. As wild celery is by far the most favorite food of our best table divers, such as canvas-backs, redheads, both the scaups, ring-bills, with the bald-pates of the non-divers, a few points upon the subject may be of value. To gather it upon our lakes, watch carefully about the latter part of the summer and you will observe long eel-like leaves resembling narrow ribbons floating upon the surface of the water near to a small flower which belongs to the frogbit

family; order *Hydrocharidceæ*, called *Vallisneria Spiralis*. When the flowers are in full bud, the fertile flower by a rapid growth on a slender scape or stem rises to the surface of the water; at the same time, the staminate flowers, which are rarely seen, break off from their short pedicle existing at the bottom, rise and float upon the surface where they expand and shed their pollen around the stigma of the fertile flower; after being fecundated, the thread-form scape coils up spirally, drawing the pod under water to ripen, so you have to pick them between the surface and the bottom. When picked, they should be placed in a can of water, kept at the same temperature of the water they were taken from and never allowed to become dry. This rule applies to all bulbs, seeds and roots which are always totally submerged; inattention to which rule forms the chief source of their failure to germinate.

The flavor of the canvas-back ducks is derived entirely from this plant, and they follow the lakes and coast where it abounds; but should the supply be short or wanting the flavor is absent and a canvas-back is no better eating than a mallard or pintail. Conversely, redheads, scaups, ringbills and bald-pates, who eagerly devour it, obtain the flavor likewise and their flesh when eaten could hardly be detected by an epicure, if it were not for their voraciousness in gobbling up everything that comes in their way lacking the aristocratic taste of the canvas-back.

The *Nymphaea tuberosa*, a non-scented water lily with large white flowers, furnishes many tubers which are eagerly sought by all of the above, especially if *Vallisneria* is absent.

The duckweed family, also furnishes seed from the following plants: *Lemma trisulca*, *L. minor*, *L. perpusilla*, *L. Valdiviana*. The water plantain, *Alisma plantago*, together with the pondweed family, *Potamogeton vasizi*, *P. notaus*, *P. Pennsylvanicus*, *P. Illinoensis*. These are the principal foods sought after, although they feed upon many of the non-divers' foods, in the same manner that the non-divers feed upon some of the seeds relished by the divers. Small fishes, shellfish, such as snails, barnacles and mussels, as well as frogs, tadpoles, worms, larva of insects and other inhabitants of marshy places, are eaten more or less during their various stages of development, in different localities, according to the various species of diver's peculiar taste.

The principal food of the red-leg mallard in the south is the chinquapin acorn, which grows profusely in the everglades. The mild water pepper, *Polygonaceæ Hydropiperoides*, of the buckwheat family, grows in shallow water where there is little current, attaining the height of three feet above the surface, its seeds shaped like buckwheat and similar in size, is eagerly sought for as well as *P. hydropiper*, common water pepper, of a pungent taste. Of the frogbit family *H. limnobium* is a favorite food of all ducks, especially the blue-winged and cinnamon teals; it grows profusely in ditches and shallow water over the United States. Wild rice is so well known as to need but a brief mention. Its seeds are eagerly sought by the non-divers, and its heavy stalks, whether standing or lying upon the surface of the water, afford a feeding place and cover hardly excelled. This, with the wild

grasses, can be kept dry, for the seed will not spoil; but the best results are obtained from northern seed, north of latitude 42°.

In stocking new grounds or restocking old ones, the best results will always follow careful and judicious planting. For all tubers, roots and bulbs a depth of from four to six feet will be found the most satisfactory. The planting should be done as follows: A perforated scoop should be attached to a long pole, and some mud of dark soil, devoid of clay, brought to the surface; this should be worked up into small balls the size of a walnut (with the shuck on), the pod of celery should be broken into two or three pieces, according to the number of seeds it contains, placed in the center of the mud ball and so on until all the pieces of pods are disposed of. Set up a stake or stakes where you wish to plant and drop in your mud balls about a foot apart upon the bottom. The use of the stake is to prevent your planting the same ground twice, and you can leave it as a landmark in order to watch the growth of the celery. Do not plant the balls too close together, for the young plants will spread under the water. All roots and tubers should be planted in this manner, keeping them in a can of water until ready for use. Even wild rice, water pepper and other seeds do better when mixed with mud, for it prevents their floating away or becoming food for various birds.

The best time to plant or sow the various bulbs or seeds is during the month of September, and they should be sown every year until a growth appears, which should be protected from birds and fish.

## CHAPTER X.

### WINGED BIRDS—WHAT BECOMES OF THEM?

This question is frequently asked, especially among duck shooters, owing to the great number of winged birds they lose during a season's shooting. Can their wings heal, do they eventually die or fall a booty to roving animals or birds of prey?

A winged or crippled duck always seeks some quiet weedy place to hide in, where it can find food without much trouble and search. Having found this sequestered retreat, the cool water allays the heat, soreness, swelling and pain which the inflammatory action of the wound produces, and the bird enjoys the great care of surgery by putting the parts to rest. After the swelling subsides, a provisional callus is thrown out around the bone from the osseous material and lymph, which nourishes the bony structure; this hardens and forms the shape of a ring, which is afterward partly absorbed when the approximation of the ends of the fragments of bone is completed. This process is rapid, and in two or three weeks is completed, when after a series of trial flights, which strengthen the muscles of the wings, the bird is able to fly short distances but will show for some time the effects of the fracture.

Owls, hawks, minks, raccoons and skunks, with the meanest of all trailers, the weasel, prey upon the wounded ducks to a great extent, those in dry marshes,

musquairs and sloughs faring the worst. Birds are frequently shot bearing a solution of continuity of bone upon their legs and wings, or marks following the same. These are generally termed "cripples," while the name of "scabs" is applied to those which have been body shot. All show symptoms of having been disabled and are poor in flesh.

## CHAPTER XI.

### FOODS OF THE VARIOUS DIVERS.

- Hooded Merganser.—C, N, P, R, S, T, Y, Z, A, a, b, c, d, e, f, g, h, i, j.
- American Merganser.—R, S, T, Y, Z, A.
- Red-breasted Merganser.—R, S, T, Y, Z, A.
- Great Bluebill.—B, C, D, E, G, I, J, K, L, M, N, O, P, A, S, T, Y, Z, a, b, c, d, e, f, g, h, i, j.
- Lesser Bluebill.—B, C, D, E, G, I, J, K, L, M, N, O, P, A, S, T, Y, Z, a, b, c, d, e, f, g, h, i, j.
- Ringbill.—B, C, D, E, G, I, J, K, L, M, N, O, P, A, S, T, Y, Z, a, b, c, d, e, f, g, h, i, j.
- Whistle-wing.—A, C, I, N, O, P, S, T, Y, a, b, c, d, e, f, g, h, i, j.
- Barrow's Golden-eye.—A, C, I, N, O, P, S, T, Y, a, b, c, d, e, f, g, h, i, j.
- Buffle-head.—A, C, N, O, P, S, Y, a, b, c, d, e, f, g, h, i, j.
- Canvas-back.—A, B, C, D, I, J, K, S, M, N, O, P, T, Y, a, b, c, d, e, f, g, h, i, j.
- Redhead.—A, B, C, D, I, J, K, S, M, N, O, P, T, Y, a, b, c, d, e, f, g, h, i, j.
- Whitewinged Scoter.—A, I, N, P, R, S, T, Y, a, b, c, d, e, f, g, h, i, j.
- American Scoter.—A, I, N, P, R, S, T, Y, a, b, c, d, e, f, g, h, i, j.
- Surf Scoter.—A, I, N, P, R, S, T, Y, a, b, c, d, e, f, g, h, i, j.

Harlequin Duck.—A, N, R, S, T, Y.

Ruddy Duck.—A, C, D, E, I, L, N, O, P, S, T, Y, Z,  
a, b, c, d, e, f, g, h, i, j.

Eider Duck.—A, R, S, T, Y, P, a, i, j.

Old Squaw.—A, C, I, N, O, P, S, T, Y, a, g, i, j, b.

The foods in small letters are eaten by the divers at all times of the year, but especially during the summer and fall, when young.

## CHAPTER XII.

### FOODS OF THE VARIOUS NON-DIVERS.

Woodduck.—A, C, D, E, G, H, I, J, K, M, N, O, P, Q, S, T, Y, Z, a, b, c, d, e, f, g, h, i, j.

Bluewinged Teal.—C, D, E, F, G, H, I, K, L, M, N, O, P, S, T, U, V, Y, Z, a, b, c, d, e, f, g, h, i, j.

Cinnamon Teal.—C, D, E, F, G, H, I, K, L, M, N, O, P, S, T, U, V, Y, Z, a, b, c, d, e, f, g, h, i, j.

Greenwinged Teal.—A, C, D, E, F, H, G, I, K, L, M, N, O, P, S, T, U, V, W, X, Y, Z, a, b, c, d, e, f, g, h, i, j.

Redleg Mallard.—A, C, D, E, F, G, H, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, a, b, c, d, e, f, g, h, i, j.

Yellow-leg Mallard.—A, C, D, E, F, G, H, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, a, b, c, d, e, f, g, h, i, j.

Black Duck.—A, C, D, E, F, G, H, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, a, b, c, d, e, f, g, h, i, j.

Pintail.—A, C, D, E, F, G, H, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, a, b, c, d, e, f, g, h, i, j.

Spoonbill.—A, C, I, K, L, M, N, O, P, R, S, T, Y, Z, a, b, c, d, e, f, g, h, i, j.

Gadwall.—A, C, D, G, H, I, K, L, M, N, O, P, Q, S, T, U, V, W, X, Y, Z, a, b, c, d, e, f, g, h, i, j.

Bald-pate.—B, A, C, D, E, I, K, L, M, N, O, P, S, T, Y, a, b, c, d, e, f, g, h, i, j.

During the summer and fall, while young, the non-divers feed largely upon the list of foods in small letters.

## KEY TO FOODS OF DIVERS AND NON-DIVERS.

- A—Minnows and small fishes.  
 B—*Vallisneria*—Wild celery.  
 C—*Limnobium*—Moss; teal moss.  
 D—*Zizania*—Wild rice.  
 E—*Elymus Virg.*—Wild rye.  
 F—*Danthonia spicata*—Wild oat grass.  
 G—*Piper hydropiperoides*—Mild water-pepper.  
 H—*Piper acre*—Water smartweed.  
 I—*Iris versicolor*—Large blue flag.  
 J—*Nymphaea lutea*—Water chinquapin.  
 K—*Nymphaea tuberosa*—Tuber-bearing water lily.  
 L—*Nuphar adventa*—Yellow pond lily.  
 M—*Nuphar kalamianum*—Yellow pond lily.  
 N—*Lemnaceæ*—Duckweed.  
 O—*Alismaceæ*—Water plantain.  
 P—*Naiadaceæ*—Pondweed.  
 Q—*Quercus*—Pin and chestnut oak mast.  
 R—Crawfish.  
 S—Slugs, snails and mussels.  
 T—Larvæ of insects; fish spawn, etc.  
 U—Wheat.  
 V—Barley.  
 W—Buckwheat.  
 X—Indian corn.  
 Y—Frog, polliwogs and tadpoles.  
 Z—Worms, and creeping insects.  
 a—*Selaginellaceæ*—Mud aquatic plants.  
 b—*Salviniaceæ*—Moss teal moss.  
 c—*Glatinaceæ*—Waterwort.  
 d—*Gentianaceæ*—Floating heart.  
 e—*Myriophyllum*—Water milfoil.

- f—*Callitriche*—Water starwort.
- g—*Lentibulariaceæ*—Water herbs.
- h—*Utricularia*—Bladder-wort.
- i—*Pontederiaceæ*—Pickerel weed.
- j—*Mayaceæ*—Moss plants.

## CHAPTER XIII.

### COVER ATTRACTIONS FOR DIVERS—DEEP BAYS, SHORES, SLOUGHS AND POCKETS OF LAKES, PONDS, RIVERS, ETC.

- Zizania*—Wild rice.  
*Calamagrostis*—Bluejoint.  
*Equisetaceæ*—Horsetail.  
*Typha*—Cattail.  
*Juncaceæ*—Rushes.  
*Iris*—Flags.  
*Nymphæa lutea*—Lotus chinquapin.  
*Nymphæa odorata*—Scented water lily.  
*Nymphæa tuberosa*—Tuber water lily.  
*Nuphar adventa*—Yellow water lily.  
*Nuphar kalam anum*—Yellow water lily.  
*Nuphar sagittifolium*—Yellow water lily.  
*Sagittaria*—Arrow-weed.  
*Arundinaria*—Canes.

In the list appended will be found the different varieties of the above, which are northern, central and southern, being adapted to all climates.

### COVER ATTRACTIONS FOR NON-DIVERS—SHALLOW BAYS, SHORES, SLOUGHS, SWAMPS, MUSQUAIDS, LAKES, PONDS, INLETS AND OUTLETS.

- Piper hydropiperoides*—Water-pepper.  
*Piper acre*—Smartweed.  
*Lemna*—Duckweed.

*Alisma*—Water plantain.

*Potamogeton*—Pondweeds.

*Selaginellaceæ*—Aquatic mud plants.

*Elatinaceæ*—Waterwort.

*Haloragaceæ*—Water milfoil.

*Lentibulariaceæ*—Bladder-wort.

*Pontederiaceæ*—Pickerel weed.

*Limnanthemum lacunosum*—Floating heart.

*Leersia*—White grass.

*Elymus*—Wild rye.

*Arundinaria*—Canes.

*Salicaceæ*—Willows.

*Cephalanthus*—Buckbrush, button-bush.

*Zizania*—Wild rice.

*Sagittaria*—Arrow-weed.

*Iris*—Flags.

In the list appended will be found the southern, central and northern varieties, applicable for any grounds; many of them produce only a low cover, but are extensively used by most ducks, especially in the fall.

## CHAPTER XIV.

NESTINGS RANGES OF NON-DIVERS, FROM GULF OF MEXICO TO BRITISH AMERICA AND ISLANDS BEYOND—WITH KEY ON LATITUDINAL LINES.

30° to 35°—S, T, U.

35° to 40°—S, T, U, W, Y, ‡.

40° to 42°—S, T, U, W, Y, ‡.

42° to 44°—S, T, U, W, Y, ‡.

44° to 46°—S, T, U, W, Y, ‡, Z, ¶, Q.

46° to 48°—S, T, U, W, Y, ‡, Z, ¶, V, Q.

48° to 50°—S, T, U, W, Y, Z, ‡, ¶, V, Q.

50° to 55°—S, T, U, W, Y, Z, ‡, ¶, V, X, Q.

55° to 60°—S, T, U, W, Y, Z, ‡, ¶, V, X, Q.

60° to 65°—T, U, W, Y, Z, ‡, ¶, V, X, Q.

65° to 70°—Z, ‡, ¶, V, X, Q.

70° and beyond—Z, V, X.

### NON-DIVERS' KEY.

S—Woodduck.

T—Bluewinged teal.

U—Cinnamon teal.

V—Greenwinged teal.

W—Redleg mallard.

X—Yellow-leg duck.

Y—Black duck.

Z—Pintail.

¶—Spoonbill.

‡—Gadwall.

Q—American widgeon, bald-pate.

## CHAPTER XV.

### NESTING RANGES OF DIVERS. FROM GULF OF MEXICO TO BRITISH AMERICA AND ISLANDS BEYOND —WITH KEY ON LATITUDINAL LINES

- 30° to 35°—A, O.  
35° to 40°—A, F, O.  
40° to 42°—A, F, D, O.  
42° to 44°—A, F, D, O.  
44° to 46°—A, F, D, O, B,  
46° to 48°—A, F, D, O, B, C, G, K, J.  
48° to 50°—A, F, D, O, B, C, G, K, J, E, H, I.  
50° to 55°—A, F, D, O, B, C, G, K, J, E, H, I, R.  
55° to 60°—A, F, D, O, B, C, G, K, J, E, H, I, R, L, M.  
60° to 65°—A, F, D, O, B, C, G, K, J, E, H, I, R, L, M,  
N.  
65° to 70°—A, F, D, O, B, C, G, K, J, E, H, I, R, L, M,  
N, P.  
70° and beyond—F, D, B, C, G, K, J, E, H, I, R, L,  
M, N, P.

#### DIVERS' KEY.

- A—Hooded merganser.  
B—American merganser.  
C—Red-breasted merganser.  
D—Greater bluebill.  
E—Lesser bluebill.  
F—Ringbill.  
G—Whistle-wing or golden-eye.  
H—Barrow's golden-eye.

- I—Buffle-head.
- J—Canvas-back.
- K—Redhead.
- L—Whitewinged scoter.
- M—Common scoter.
- N—Harlequin duck.
- O—Ruddy duck.
- P—Eider duck.
- R—Old Squaw.

## CHAPTER XVI.

### ENEMIES OF SEEDS, BULBS, ROOTLETS AND FLOWERS.

*Fulica Americana*—COOT OR MUD HEN:—Eats shoots and rootlets of teal grass, destroys large quantities by diving to the bottom and rooting it up, bulbs or tubers of lotus and lily with their shoots, wild rice and celery shoots, water-pepper, smartweed, etc.

*Ionornis Martinica*—PURPLE GALLINULE, *Gallinula galeata*—FLORIDA GALLINULE:—Eat shoots and tubers; the bloom of wild rice, duck and pond weeds, teal moss, flags, etc.

*Porzana Jamaicensis*—BLACK RAIL; *Porzana Novboracensis*—YELLOW RAIL; *Porzana Carolina*—CAROLINA RAIL:—Eat teal grass, duck and pond weed and shoots, wild rice, wild barley and oats, etc.

*Ectopistes Migratorius*—PASSENGER PIGEON; *Chamaepelia Passerina*—GROUND DOVE; *Melopelia Leucoptera*—WHITWINGED DOVE; *Zenaidura Carolinensis*—CAROLINA DOVE:—Eat wild rice, barley and oats.

*Dolychonyx oryzivorus*—BOBOLINK, RICE BIRD:—Eats wild and tame rice, barley and oats.

*Xanthocephalus Icterocephalus* — YELLOW-HEADED BLACKBIRD; *Agelaius Phœniceus* — REDWINGED BLACKBIRD; *Scolecophagus ferrugineus*—RUSTY

GRACKLE; *Scolecophagus cyanocephalus*—BREWER'S BLACKBIRD; *Quiscalus purpureus*—PURPLE GRACKLE:—Eat wild rice, barley and oats, and small aquatic seeds.

## CHAPTER XVII.

### ENEMIES OF DUCKS.

#### BIRDS.

*Corvus Americanus*—COMMON CROW :—Eats both eggs and young on the ground.

*Circus Hudsonius*—MARSH HARRIER.

*Buteo Borealis*—RED-TAILED HAWK.

*Buteo Borealis Krideri*—KRIDER'S HAWK.

*Buteo Lineatus*—RED-SHOULDERED HAWK.

*Buteo Swainsoni*—SWAINSON'S HAWK.

*Buteo Latissimus*—BROAD-WINGED HAWK.

*Archibuteo Lagopus* — AMERICAN ROUGH-LEGGED HAWK.

*Archibuteo Ferrugineus* — FERRUGINOUS ROUGH-LEGGED HAWK.

*Haliaetus Leucocephalus*—BALD EAGLE.

*Bubo Virginianus*—GREAT HORNED OWL.

*Syrnium Nebulosum*—BARRED OWL.

*Scotiaptex Cinerea*—GREAT GRAY OWL.

*Asio Accipitrinus*—SHORT-EARED OWL.

*Strix Pratincola*—AMERICAN BARN OWL.

*Falco Sparverius*—SPARROW HAWK.

*Lanius Borealis*—GREAT NORTHERN SHRIKE.

*Lanius Ludovicianus Excubitorides*—WHITE-RUMPED SHRIKE.

(The three latter occasionally kill the young ducks soon after they are hatched.)

These birds are most destructive in catching their prey upon the ground, and kill many young water-fowl in the grass and in marshy places, especially northward.

*Aquila Chrysaetus*—GOLDEN EAGLE.

*Accipiter Cooperi*—COOPER'S HAWK.

*Accipiter Fuscus*—SHARP-SHINNED HAWK.

*Accipiter Atricapillus*—AMERICAN GOSHAWK.

*Falco Columbarius*—PIGEON HAWK.

*Falco Richardsoni*—RICHARDSON'S MERLIN:

Catch their prey upon the wing; the worst of all are Richardsoni, sharp shinned and goshawk.

#### ANIMALS.

SKUNKS, WEASELS, MINKS, WOLVES, FOXES, MARTENS, FISHERS:—Form the principal list of animals which prey upon the ducks, especially when the birds are wounded or in a young or flapper state.

#### FISHES.

BLACK BASS, PICKEREL, PIKE, MASCALONGE, GARS, DOGFISH, TURTLES.

## CHAPTER XVIII.

### EGGS TO DUCKLINGS.

When the chill frosty nights of winter have reluctantly loosened their icy grip and soft April showers have fallen; when shoot by shoot the grass grows green, buds swell and burst into blossom and green leaves appear as the vivifying sap rushes to the top-most branches; the redbud and the crab-apple trees fling their dainty blossoms to the breeze, and the pure morning air is impregnated with their sweetness. Long lines of ducks and geese pass over, wending their way to northern homes, seeking a haven free from molestation in their efforts to raise their callow brood.

'Tis May. All through this vast continent, and beyond, over countless islands far from human eye, on barren mainlands, swamps and musquais or bogs, ducks abound, having paired during their journey northward. The approved nesting site is selected in hollow trees, woodpecker or squirrel holes (like the woodduck, hooded mergansers and whistlers); upon the ground in secluded bunches of grass or sedge, in rushes, flags, canes or rice above or touching the water's edge; in wheat, barley or grassy fields near or even far from sloughs or water holes, in fact, every conceivable place adapted to each particular species is now intuitively sought.

Building commences—sometimes the drake is not

a hard worker, but nearly always assists—the nest is soon completed, eggs are laid (varying in color from pure white to blue and green, a few spotted or freckled, assuming all colors intermediate), the eggs varying in number from eight to sixteen, according to the species; usually, one egg is laid each morning. Many exceptions are to be found, in fact, the older the bird the more eggs she lays. Moreover, the numbers differ in various localities, especially when climatic influences are considered; as is the case with the wood-duck, hooded merganser and bluewinged teal in the South, in contrast with the nestings of the same ducks in Wisconsin, Michigan, North Dakota and Minnesota, where the clutches are smaller. The same may be applied to many other species, viz., they lay larger clutches in the South than in the North. Some warm-weather birds have two clutches, whereas the extreme northern varieties do not unless the first is taken or destroyed by high water, prairie fires or the plow; for thousands of mallards' nests are turned under on the wheat and barley stubbles of Minnesota and the Dakotas every year.

Nests are made of every available material, usually taken from the surrounding grasses, weeds, roots, fibers, etc., and some are beautifully lined with down; notably the eider duck and old squaw pluck the valuable down from their breasts. It is said, if the nest is robbed once or twice and the duck is unable to supply enough for the next lining, the drake then furnishes it, which may be recognized by its being considerably whiter than the female's. The quantity of down in the eider duck's nest is estimated at about half a pound,

and is so elastic that one ounce will fill a large hat; furthermore, the down from the nest has double the elasticity of that obtained from a dead bird. In Iceland the down is a valuable article of commerce, being sold when cleaned for three rix dollars a pound. In 1750, the Icelandic Company sold down amounting in value to \$4,250, beside what was sent to Gluckstadt (Van Troil's "Letters on Iceland").

The divers have more down than the non-divers, which is also plucked generously from their breasts. Woodducks, hooded mergansers and whistlers often fill the hollow of trees they have chosen with their own feathers, and feathers of other birds are frequently found mixed with them; but when they build on muskrat houses, in holes in banks, rocks, etc., they usually use dry grasses, weeds and flags for their outer covering, thus rendering the nest less conspicuous to the passer-by.

After the usual period of incubation, which differs slightly in various species, the first peep of the newly-hatched ducklings finds the drake *non est*; for his Highness, after the duck has begun to set, neglects to pay his accustomed visits to her and goes off to have a good time in the company of other drakes, most of whom have a spouse like himself, while others are mateless, there being always a larger percentage of males among both divers and non-divers. The duck now leads the way toward the nearest piece of water, or, if on the bank or in the weeds, to some quiet place hidden from observant eyes; keeping strict guard over her brood, rarely seen, yet watching closely for the first sign of danger from the entangled overhanging grass.

The ducklings have many enemies ready to prey upon them. At the sight of one, the duck sneaks off, drawing away her brood to a place of safety. Should the enemy approach too closely, she will flutter through the weeds or upon the surface of the water and endeavor to attract all attention to herself; if pushed she will fly a short distance, alight and work back toward her brood, which she knows has scattered and hidden at the first notes of her alarm call. Occasionally, she will pretend to have a broken wing or to be crippled, if the intruder be a human being, in order to draw him away; but acts differently toward an animal or a bird of prey.

Snakes are great enemies to young ducks, especially garter, bull and water moccasin snakes. Pickerel, pike, mascalonge, bass and catfish, as well as gars, of the fish family. Minks, opossums, skunks, weasels, foxes and wolves of the animals; while of the bird family the marsh harrier, which so closely beats the fields, drops many a duckling down to his mate whilst flying over her nest; and the pigeon and sparrow hawks, short-eared and hoot owls, in fact, all the various hawks and owls which catch their prey upon the ground, as well as the shrikes, thin their numbers constantly.

The food of the ducklings consists of frogbit, teal grass, duck and pond weeds, seeds of wild barley, rice, oats and rye; young and tender shoots of grasses and sedge, insects and their larva, tadpoles, small frogs, polliwogs, leeches, slugs, water snails and other foods to be obtained in marshy places without diving.

## CHAPTER XIX.

### DUCKLINGS TO FLAPPERS.

In the old heathen mythology, the year consisted of ten months, the third (May) derived from *Majores*, the old men; whereas, June was from *Juvenes*, signifying the young.

Glorious June! First month of summer, with the beauties of Nature as yet unsullied or withered by the sun's scorching rays; its green foliage tossing in the breeze with waving grasses and lovely flowery dells. In the forests and groves warblers flit from spray to spray, the whistle of the thrush, the song of the bluebird and the voice of the turtle-dove are heard in the land. Now the ducklings have their best time, carelessly swimming here and there, chasing a fly, or stopping to pick the various seeds and green shoots from aquatic plants, until warned by the cries of the old duck to follow her and remain within reach and shelter of her protective wing.

What a pretty picture they make! Little fat, yellow downy sprites, with lustrous black innocent eyes, sporting quaintly here and there, careless and oblivious of the pitfalls and snares which await them. Ah! A sudden rush! A splash! A scramble of the brood upon the water, a tremendous flutter of the mother, a quick gathering and drawing away from the place of disturbance, a count; alas! one is missing and now lies in the capacious maw of some voracious pike!

Learn a lesson, heedless ones! Or the brood will soon be depleted and few remain to tell the tale should you linger long in the vicinity of that ill-fated spot.

They remain in the heavy grass, flags, rushes and weeds around water-holes, either where they were hatched or have been taken by the mother bird. Their food varies as they grow older; new seeds ripen, and the water having subsided has left all kinds of animalcules, old seeds, roots and muddy banks exposed.

They gradually obtain a few feathers in the wings and tail, their downy body covering is replaced slowly by feathers, which, growing in tracts soon lap over and envelope their bodies, and they are able to make long excursions around the marshes and sloughs adjacent to their duckling home. Generally, only the duck remains in constant attention to the young brood until they pass the flapper state, which name they receive when about half-grown; but when, owing to the wing feathers growing slowly, they are not yet able to fly.

It can readily be supposed that during the flapper stage they instinctively learn to become adepts in hiding, a trait gained largely from the experience and teachings of their mother; for one who is unaccustomed to seeing them at this period of their development would hardly credit the skill and cunning they show in avoiding and threading their way out of danger, and, to an inexperienced eye, hiding in almost impossible places.

## CHAPTER XX.

### FLAPPERS TO FLYERS.

The month of July, with its sultry heat and breezeless nights, is generally conceded to be the most despised month of the year. The mosquitoes have their innings, greenhead and bulldog flies render the cattle miserable, and all Nature feels oppressed. The creeks and streams are low, the sloughs, musquais and ponds are dry, save where some hole or deep depression contains some stagnant algæ-covered water.

Now the flappers begin to move, seeking with unerring instinct fresh water-holes. Although not able to fly, they can walk and run with ease through the by-paths, entangled sloughs and marshes, until they find the places they seek; and continue doing so as the pond holes and sloughs become dry and urge them onward. Those upon the big lakes, rivers and water-courses do not change so often, owing to the presence of water; yet, they, too, enjoy to swim in and explore new territories, as well as their less fortunate relations, although not compelled to do so unless the food supply becomes scanty and hard to find. New seeds have now appeared so that their food consists of more varieties; insect life with larva is more abundant, owing to the watery environments being curtailed.

They now grow larger and fatter, having lost all their downy covering, which has been replaced by feathers which grow fast, soon overlap and spread

until they have attained a shingle-like appearance. Now the stimulating food they have previously enjoyed materially assists them, for the process of moulting greatly depresses the system. As their wing feathers grow they test them in short flights, thereby rendering themselves more capable of longer ones in their battle with the world. The drake about this time rejoins his family (speaking generally of all the species), and they are taught to dive and tip up according to their species, whether divers or non-divers, and learn from the association of their parents the intricate science of duck lore.

They differ in plumage from their parents, and it may be taken as a rule, when their parents are nearly alike in plumage, they differ entirely; but when the parent birds differ widely in coloration, they stick to their mother's colors.

## CHAPTER XXI.

### NORTHERN FALL FLIGHT.

The month of August has arrived, the aspect of the landscape has changed, the apple trees are loaded with early fruit, peaches are turning red, and the luscious blackberry hangs temptingly on every bush. The nights are cooler, and Nature seems relieved from her heated, sweltering past.

The first movement the ducks make, when they out-grow the flapper state and have tested their wings in short flights, will be to make excursions to bodies of water or slough holes, adjacent to their watery places of refuge, which as flappers they have occupied more or less since they were ducklings. These visits are made in the evening, about sundown, returning soon after daylight, gradually increasing in numbers; at first, each flock remains alone, but is soon joined by others, and the young ducks mix with their own species, and become little flights as the summer advances and their wings get stronger. Later, during the month of August, they extend these flights, in company with others, and travel northward, scarcely noticed except by the hunter, who keeps constantly observing new ducks in places where he had never observed any before.

By gradually extending these small excursions they travel through the state, and frequently beyond it, so that pond holes, sloughs, rivers and streams which

had only known one or two species of ducks, find their numbers increased; and, also, are frequented by other kinds. The hooded merganser, woodduck and ringbill seek the running streams of wooded rivers and their tributaries; the bluebill, redhead and canvas-back open lakes and deep ponds of water, secluded from view; while the bluewinged teal, redleg mallard, spoonbill, black duck and pintail frequent sloughs, marshes and swamps, where they revel upon the wild rice, duck and pond weed and frogbit.

These little flights occur in all states, to a greater or less extent, until September; but a drifting always occurs north, south, east and west after that month, as food becomes scarce, water low or some other cause diverts the ducks' movements.

## CHAPTER XXII.

### LOCAL FLIGHTS—ROOSTING, FEEDING AND PLAY GROUNDS.

The month of September is gladly welcomed by the sportsman. How eagerly he looks forward to the time when he can once more push his boat through lotus and lily pads, down the tall wild rice which fringes the shore of old hunting grounds, and drink in deeply the pure morning air. Now the ducks have settled down to some certain locality, and have selected three separate grounds for feeding, roosting and playing purposes. The non-divers' grounds are always apart from the divers' with slight exceptions, viz., when the latter drift in and feed in shallow water which contains some favorite food.

At the first break of day, or even before, a flight commences from the roosting grounds to the feeding places, which continues until about eight o'clock; this is called, in hunting parlance, the morning flight. Upon the lakes, large sloughs and swamps they stay until about ten o'clock, or thereabouts, and then drift off to their playgrounds in small flocks, singles and pairs. If they are feeding upon the prairies in wheat, barley or corn fields, they invariably leave the feeding grounds whenever their crops are full of grain and proceed to the nearest pond hole or body of water, to soften the grain and pick up sand and gravel for their gizzards, frequently returning to the same fields for more in a short time but soon going off to

their playgrounds, which may be in the same field, where they usually stay until about three o'clock p. m. This constitutes the second flight.

In the spring mallards and pintails are frequently to be seen feeding all through the day, especially in wet weather, and traveling backward and forward from water holes to feeding places; but this does not detract from the general usage, for ducks, taken collectively, follow the above order.

About three o'clock p. m., they begin to drift off, if undisturbed, to their feeding grounds again; where they stay until about sunset, when they fly off to their roosting grounds in bunches, singles and pairs. These constitute the afternoon and evening flights. The divers are conspicuous by their absence in regard to these flights and grounds, except upon large tracts of water, where the flights of both lie over the same territory, although they seek and use different grounds.

A roosting ground is situated in some quiet, sequestered bay or weedy corner of some large lake or body of water, where weeds, canes, flags and grasses abound; in the middle of some swamp, slough or musquaid, where there is some open water surrounded by grasses or canes, when they can swim about and through them, pick up seeds and gambol around in the heavy growth without fear of molestation; but, judging from the splashing, quacking and general disturbance which continues throughout the night, especially when numbers are flocked together, it would hardly convey the idea of a sleeping place.

Most of the non-divers roost apart, by themselves, although pintails can frequently be found with yellow-leg mallards and greenwinged teals in the spring mi-

grations, and with the bald-pates during the fall. The redleg mallard likes to roost in the pockets of lakes fringed with pin oaks and buck-brush, in the heavy growth of water smartweed, the seed of which it is extremely fond of, as well as to pick up the acorns from the bottom of water where the oaks overhang the banks or grow in the water, as in the glades. They never play during the day upon their roosting grounds, but, being voracious feeders, eat a greater part of the night, although they go regularly to the glades for their favorite mast during feeding hours.

A playground is the term applied to a piece of water situated in the middle or end of some slough, lake, marsh or musquaid distant from the margin, where ducks can be secure from danger; generally it is covered in spots with lily pads, rice, rushes or other aquatic plants. To these places the ducks retreat directly after feeding and stay during the middle of the day, idly floating on the water; some with their heads upon their backs or under their wings, others swimming playfully about and chasing each other; sunning themselves, occasionally diving and picking up seeds, or otherwise disporting according to the particular species to which they belong. Here is to be observed the peculiar tipping-up habit indulged in by non-divers, who obtain their favorite tidbits of food in that manner, and not by diving; therefore, they use shallow water from the surface of which they can readily reach their food. They depart from these grounds in small flocks, as before, to their respective feeding grounds about three o'clock p. m.; should the wind be blowing strongly and the surface of the water roughened, they will drift to the weather side

of the grounds for protection, hence the need for a good cover upon the margin of the grounds. Should any divers be observed, they will be found apart from the non-divers and occupying deeper water, unless stormy weather compels them to seek shelter.

A feeding ground may be in wheat, corn or barley fields, particularly for mallards, pintails or green-winged teals, edges of wild rice, smartweed or water-pepper, wherever frogbit or duckweed is to be found. Bluewinged teals delight in wild rice beds and frogbit, where the seeds float upon the surface of the water in long mossy strings; they like to neighbor with the coots or mudhens. Upon sloughs, swamps or ponds, wherever food is to be found, they muster according the ratio of food to be found, and ducks readily accommodate themselves to food conditions as necessity requires. The food of the redleg mallard in the Southern and Middle states consists principally of oak mast and water-pepper; whereas, in the North and West barley, wheat, with wild rice, are their favorite foods.

Greenwinged teals flock around the muddy edges of sloughs, in cornfields, in and around shallow pond holes and marshes, creeks, banks of lakes, etc., where slugs, snails, larvæ of insects and tadpoles abound, as well as the mouths of sloughs and ditches, where frogbit and duckweed profusely abound.

Canvas-backs, redheads, bluebills and other divers, as ringbills, buffle-heads, whistlers, etc., flock to lakes and deep sloughs, where wild celery, lily and lotus beds thrive; where such food is to be found the three first mentioned divers rarely leave until they have depleted the bed. Bluebills and ringbills like to associate in flocks called rafts, and float about during the middle

of the day when the sun is warm and the water smooth.

The merganser family, with the scoters, feed chiefly on fish, often rotten in the spring, which they find either on the surface or embedded in floating ice.

Local ducks have three distinct flights similar to migratory birds, but the third or last issue of the local ducks in the fall always occurs before the migratory birds come down from the North. This occurs from Minnesota through the states south. They can readily be distinguished, for the local birds have not attained their full plumage, whereas, the migratory birds have generally attained it by the time they reach the Canadian line.

## CHAPTER XXIII.

### SOUTHERN FLIGHT OF NON-DIVERS HATCHED IN THE UNITED STATES.

The glorious harvest moon of September has dwindled away, dark nights reign supreme over swamp, lake and slough, a forerunner of the first southern flight of our tenderest warm-weather birds. The flowers of the lily and lotus have faded and gone, the blue and yellow flags are shriveled, and the heavy growth of aquatic plants once so hard to push through is scarcely visible, leaving the cool water free and clear.

The bluewinged teals are getting uneasy. They gather upon some large body of water near their accustomed grounds, and an unusual excitement prevails among them. This occurs for two or three days, when, about four o'clock in the afternoon, a flock will rise from the water and instead of going to their feeding grounds, as usual, will sweep up and down over its surface and alight again. These tactics the ducks pursue for a short time, each flock being increased in numbers until they have assumed a considerable size. Now a change occurs; instead of alighting, as usual, upon the water after one of their circles, they mount higher and higher in the air, divide into several flocks, each one disciplined by old birds, and travel southward until nightfall, when they alight upon regular stations or sheets of water which year after year are selected by them. The remainder act in the same

manner until all are divided into flocks and have departed, leaving only a few behind and those are either scabs or incapacitated for a long flight. This only seems to apply to our local birds, hatched in the United States, the migratory teals usually departing in the dark of the moon. The second issue comes from still farther north, while the third issue is made up from birds raised in the extreme northern parts.

A period of four to five days elapses between each of these issues, but the bluewings are among the first of the warm-weather birds to migrate southward, as, upon the other hand, they are the last to arrive in the spring.

The migration of the woodduck is marked by their assembling in certain beds or patches of willows, buckbrush, etc., late in the afternoon, arriving by singles, pairs and little flocks; and they are gone before day-break.

The redleg mallard migrates all the day and night in large flocks, which are plainly to be seen, especially during a change in the weather, with cold north winds; this occurs in October, when the frosty nights appear.

The pintails and baldpates frequently come down together. They collect, like the teals, in open water; only they do so in a shorter time and depart through the night.

## CHAPTER XXIV.

### SOUTHERN FLIGHT OF DIVERS HATCHED IN THE UNITED STATES.

When October skies are studded with galaxies of stars, the milky way shines brighter and the moon called in common parlance the "Hunter's," is in its first quarter, the first flight of the divers commences.

The ringbill and bluebill, buffle-head, ruddy, red-head and canvas-back are the first to arrive. They, likewise, travel southward in three issues, although not so plainly marked in the interior as coastwise. Two or three days intervene between the usual flights, and they are mostly gone before the first issue of the migratory flight arrives from the North.

The bluebill, ringbill, redhead and canvas-back assemble separately, in packs or rafts, upon some wide open water or lake, and depart like the bluewinged teals; only they travel in smaller flocks, fly farther and all through the night. A few redheads frequently get mixed up with the bluebills and travel with them. The remainder of the divers, as a rule, migrate at night, and therefore are not so readily observed. Their usual flight in the interior is down the large rivers, over the chain of lakes, etc., while the hooded merganser clings to the small wooded rivers and streams with bushy shores.

## CHAPTER XXV.

### FALL MIGRATORY FLIGHT OF DUCKS NOT HATCHED IN THE UNITED STATES.

The various species of our *Anatidæ*, which have traversed the length of the great continent of North America and beyond, seeking places in which to raise their young on lonely islands, musquaidis, lakes and swamps where straggling footsteps rarely intrude or desecrating hands are laid upon the millions of eggs scattered profusely on every side; where feathers and excrement are thickly strewed around, and the din of their cries, the rustle of their wings and the repeated roar of rising flocks echo and reëcho from the cliffs and through the cañons of the adjacent mainland; now return with their young to a warmer clime, situated below the frost line, in latitude  $34^{\circ}$  to  $35^{\circ}$ , impelled by Nature's great and unerring law. Their migratory propensities and peculiar straight, curved and wedge-shaped lines, which each peculiar species assumes under regular generalship, differ so from each other in shape, length, numbers and flight that in all countries they appear endowed with characteristic weather prophecy, as high in the air they shape their course, guided by unerring instinct to their southern goal.

These migratory flights, whether during the spring or fall, differ widely from the local ones in shape, form, numbers, height and speed; they are easily recognized

by hunters who have studied the habits of the ducks closely.

When the autumnal frosts with relentless fingers touch the green foliage of the forests, woods and groves, beautiful tints of yellow, brown, crimson and gold appear, which collectively form a kaleidoscope Nature alone can produce. Leaves deprived of vital sap flutter to the ground, and wafted by the breeze whirl, eddy and rustle across our path. When the grass turns whiter, the golden-rod fades upon our prairies and all vegetation trembles at the first impact of winter's chilling touch, then the first issue arrives upon our Canadian borders. Some drop into lakes, sloughs, musquais and rivers; others scatter out and alight in wheat, barley and down rice, which abounds in shallow places; while others, high in the air, disappear in the southern horizon.

The best grounds are quickly discovered, and an organized flight is formed to feeding, roosting and play grounds. This continues from ten to fourteen days, when they again flock and depart southward. After an interval of about four or five days, the second issue arrives, which although acting in a similar way does not stay so long.

The clear, frosty nights of October have arrived, some snow has fallen, but has quickly melted; ice is formed every night and the foliage has disappeared from the trees, which, shorn of their beauty, stand like spectered skeletons, while the leaves, brown, yellow and wet, form a carpet over the once green grass; water in the still lakes and sloughs has been kept open by the warm sun during the day and by the ducks at night. Suddenly the second issue flocks together and

leaves, hardly a duck remains; a cold wind whips in from the north, the forerunner of a northern winter. Down will come the third issue, pell-mell, in the advance of a snowstorm. A flurry of the elements for a day or so, a few birds stay around the open water, but the moment it freezes up—which is quickly in the north—they depart never to return, even if a thaw should afterward occur.

Their migration (especially among the non-divers) is plainly marked, the ducks having first collected from all parts into large pièces of open water. The divers migrate by themselves. They follow the large rivers, chains of lakes and sloughs in the interior; along the shores of seacoasts; drifting more inland, where marshy land abounds, preferring the night for their travels, so that lakes, rivers and large bodies of water which had had few ducks visible upon them, find the birds well represented in the early morning.

The relentless cold of the North, with its sleet, hail and snow, steadily pursues them and presses them onward, the ducks tarrying here and there as weather permits, until they are forced to seek the welcome vicinity of the frost line. Should warm weather prevail for a few days a few of the non-divers, as green-winged teals and mallards, will work back to old feeding grounds if food is plentiful: in the same manner ringbills, of the divers, appear here and there upon the lakes and wooded sloughs of the Mississippi bottoms, a degree or two above the frost line.

## CHAPTER XXVI.

### SOUTHERN FLIGHT SOUTH OF THE FROST LINE.

As the kind and gentle hand of Time falls lightly upon the aged head of some member of our family, so falls the hoary touch of winter upon our fair and lovely South. No wonder birds fly southward to sunny skies, where love and passion dwell, waxy japonicas are scattered in profusion, and realms of oleanders, roses and flowers of every hue relieve the somber cypress shades; where the air is filled with the odor of pine, honey-suckle and the large white flower of the bay; leaving the chill, dreary, flowerless North to others of sterner mold.

The migratory flights, after passing the frost line, gradually assume a radical change; they merge into the local flights which have preceded them. All assume a full plumage, scatter and drift in all directions to well-known grounds and resorts. But, notwithstanding they are out of the ice and frost, they obey the common law which impels migratory birds—tempered somewhat by the openness of the weather—and proceed to the southern coast line, staying awhile in the Gulf States, the islands in the Caribbean Sea, Central America and the northern half of South America.

After a short interval they commence to work back again, in flights as before, being influenced by early or late spring existing in the North, but all gradually approaching the frost line. Thus we have "Ducks com-

ing North" now, instead of "Ducks going South," a common phrase in the South, depending altogether upon the severity of the weather at the frost line as well as the abundance of food to be found south of the line. The latter alone will keep birds longer southward, but they make up for it by longer flights and shorter stops on accustomed grounds when incubation warns them to hurry on their way. Many eggs are frequently found on the borders of sloughs, lakes and ponds, laid before they reach a suitable nesting place according to their species.

The non-divers traverse the waterways of the large inland waters, the Mississippi, Ohio, Missouri, and their tributaries. The divers either go coastwise or come up the Mississippi and branch off from their tributaries, a certain percentage always coming through the interior. A drifting always occurs through the vast swamps, tame rice fields, lakes and bayous, especially over the Great Dismal Swamp in Virginia and North Carolina to the east, and up the Rio Grande, Texas and the Indian Nation to the west, before they reach the line. The same local flights occur south as well as north of the frost line, governed by cold weather, storms and the local food supply.

## CHAPTER XXVII.

### NORTHERN FLIGHT SOUTH OF THE FROST LINE.

The Christmas festivities are over, the last firework has been exploded, the holly's prickly leaf and scarlet berry remain; and the often half-suppressed exclamations heard in the old halls are suggestive of that Druidical relic, the dear old mistletoe. The balls, routes and parties have passed, everybody feels most jolly tired and half glad it is over. The yellow-leg mallards, pintails and greenwinged teals through Florida and the adjoining states are getting uneasy, and gather together for their migratory flight and travel northward toward the frost line. Now "Ducks are coming North," stopping at their old feeding grounds, staying for a shorter or longer period, as the winter north of them is open or severe.

The canvas-backs, redheads and mergansers (except the hooded variety), of the divers, feel the same instinctive pang and travel coastwise through the tributaries of the large rivers, and over lakes and sloughs. These form the van of the cold-weather birds, are always restive, and show an anxious propensity to be "always on the wing."

The bluebills, ringbills, ruddy, old squaws, goldeneyes and scoters follow; gradually drawing nearer and drifting up to follow in the rear of the above.

The woodducks, redleg mallards and black ducks are approaching, waiting until the ice under the heavy rains and warm, genial suns shall have entirely melted

away. The bluewinged teals, like a coy maiden, remain in the rice beds, associating with the Carolina rails and mudhens, all obeying instinctive and reasoning proclivities peculiar to themselves. But, sooner or later, they, too, tired and satiated with their southern relations, are impelled by Nature to turn their heads and again shape their course northward, where the lily pads are showing and the once ice-bound sloughs, lakes and swamps welcome them once more in their spring freshness.

## CHAPTER XXVIII.

### MIGRATORY SPRING FLIGHT.

Distributed below and up to the frost line during the month of February are countless flocks of ducks, both divers and non-divers, each conforming to a general law, viz., as the shallowness is to the depth, so is the species of ducks which inhabit it; both are representatives of cold-weather birds, and all are awaiting open water for their intended northern migration.

An observer would call to mind a similarity (especially if he had been present when the Indian Territory was first opened for settlement) to the late Oklahoma race, which occurred but once, whereas the former occurs every year; the later the opening of spring, the greater the rush, with this difference; the race for the new territory was to commence upon a certain day and at a given hour, the signal being the discharge of a cannon at 12 m., which found every contestant booted, saddled or hitched and ready to strive for the advantage of priority.

Let the appointed day represent the sudden opening up of water holes, or open water obtained from melting snow or climatic changes producing a rainfall, and the signal gun the arrival of one or more bodies of scouts, bands which had been sent out to reconnoiter and which upon returning had reported favorably. Then the pintails in the van, with the yellow-leg or ice mallards in the rear, but usually in the

minority, start in the middle of the afternoon and with a mad rush sweep over and around bodies of water, rise higher and higher, and push forward over the imaginary frost line, impelled by that instinctive guidance inherent in all migratory birds—to reach that goal Nature ordained for their nesting and the procreation of their species. On they travel, line after line, all fully disciplined, all old birds, not those novices who learned the dangerous and insidious snares and pitfalls which befell them upon their first journey, when as young birds they obeyed the mandates of Nature and, guided by their elders, left the icebound lakes, sloughs and rivers of the cold, dreary North for sunny climes and more congenial fields where food profusely abounded.

Darkness calls no halt, no change, save the wheeling in and out as some fresh bird takes the lead and lets the weary one fall back to the rear. All through the night one hears the rustling wings, soft chattering from one to the other (particularly among the pintails), perhaps commands passed along the line, notes of encouragement or explanatory geographical teachings concerning the territory over which they are then passing. Ever and anon the leader falls back to the rear, the line wavers, a new bird rushes from the rear to the front, fans the way for his companions and with waving wings cleaves the air, rendering the progress of the others easier. Miles upon miles are passed. Suddenly a large piece of open water looms up in the distance, or sheets of ice containing water holes are seen; with a whirling sweep they rush downward, toward it, quickly circle, drop into the water, if the opening be large enough, or

upon the surrounding ice, lave their burning feet and cool their thirsty throats rendered dry by their rapid travel.

The heat and dryness which attack migratory birds when high in the air, during a long flight, are so well known by handlers of carrier pigeons that they often moisten the birds' feet in cool vinegar, before flying them, to prevent their stopping at watering places to cool themselves, thereby averting danger and keeping notes attached to the homers' bodies or tail quills dry and safe.

In the case of a quick freeze, where sheets of water have been suddenly covered with ice, ducks will alight in large numbers in the middle, and by their weight depress the ice in the center so water will flow toward them from weed-holes or cracks existing upon the surface, thereby obtaining water by coöperation where singly they would assuredly fail.

A short stop and away to the northward, diverging their flight—according to the proportion of water—until they reach the goal their scouts have already explored. They quickly find out their accustomed feeding grounds, and it is astonishing to observe with what infallible skill they detect and know to a certainty whether a corn field has been shucked or not; one can always tell strangers from local birds by the feet and bills of the former being clean, whereas, those of the local birds upon their return to the water are soiled from the mud of our fields or prairies. They quickly arrange their various grounds and settle down.

These flights continue for several days, pintails as a rule leading, mallards coming next, followed by the greenwinged teal. A great many pass over high in

the air, as the weather permits, and no calling or decoys will allure them. Fresh birds soon take the places of those who first came, and the weather determines their advance or retreat. Often they are driven back by steady freezes or snowstorms nearly to the frost line, for the weather in the early spring is always variable.

A scouting party of pintails or mallards consists of several flocks of old birds, evidently appointed and sent out by generals from the outposts of the front to prospect and ascertain the area of the water question. They appear suddenly after a change of weather, the result of a warm current, a thaw, a rainstorm, or whenever open water appears derived from air holes, either made by fishes, muskrats or hunters. The latter cut channels in the ice, and by tipping up the edges of the cut pieces slide them under the solid parts, taking care to leave no fragments upon the surface or upon the edges of the ice; an open channel is thus formed which soon becomes increased by the agitation of the water, being rippled by the wind or by the jumping of the fishes who soon flock to these improvised air spaces. These air holes are, indeed, a vital necessity for fishes in shallow lakes; lacking which millions die from non-oxygenation. A beautiful illustration of instinctive preservation is frequently seen near the frost line, where muskrats are scarce, and shallow lakes are frozen over; there fishes will jump all night, making a ripple which agitates the water and prevents deep holes from freezing over; should these holes freeze the fishes having collected to these deeper places would soon die from want of oxygen, did they not obtain a fresh supply in this

manner. Ducks also materially assist in keeping water open, by swimming around throughout the night. Muskrats always have open water around their houses. Large cracks are also formed by the contractions and relaxations of frost, which with a roar like distant thunder rends the surface of the ice. A crack thus started will run for a great distance, usually lengthwise of the lake, making an upheaval of the two edges, which, exposed to the wind and sun, soon produces a channel. This instantly attracts the fishes, which by their rapid movements create undercurrents and materially assist in the opening of a channel.

Directly after one of these upheavals, scouting parties will be observed, which, after a quick survey and dip, depart to their officers and report. If satisfactory, the report produces the rush; if not, new scouts are started or the same ones are sent out again. When a flock of pintails or mallards is seen going south high in the air during the latter part of the winter, especially in the afternoon, one can readily understand they are a scouting party returning from an excursion; and, on the other hand, when a flock is seen passing over in the morning, flying north, it most probably is upon a prospecting tour, and a change in the weather may be shortly expected.

The bulk of our ducks during the past decade has rapidly moved westward in their flights; while the nesting grounds have moved northward. It now rests with the sportsmen of America to determine their destiny for the next. The existence of a law which would include the whole United States would, in my opinion, practically cover the ground. Take August 15 until January 1, would give two months' shooting

in the extreme north, two months in the extreme south, while the central would get about three, varying according to the state of the weather and the location of central hunters. If such a law were indorsed by Canada, in a few years we would find a marked change for the common good.

## CHAPTER XXIX.

LIST OF SEEDS, BULBS, TUBERS, ETC., COMPRISING  
OUR WATER-FOWLS' ESPECIAL FOOD — WITH  
GRASSES, CANES, FLAGS, ETC., FOR COVER.

(*Taken from Gray's Manual.*)

Order HYDROCHARIDACEÆ (Frogbit Family  
—Tape or Eel Grass).

Tribe VALLISNERIA:—Flowers strictly diœcious; the sterile numerous and crowded in a head on a conical receptacle, enclosed in an ovate at length three-valved spathe, which is borne on a very short scape; stamens mostly three. Fertile flowers solitary and sessile in a tubular spathe upon an exceedingly lengthened scape. Perianth (calyx) three-parted in the sterile flowers; in the fertile with a linear tube coherent with the one-celled ovary, but not extending beyond it; three-lobed (the lobes obovate); also three lineal small petals. Stigmas three, large, nearly sessile, two-lobed. Ovules very numerous, scattered over the walls, orthotropous. Fruit elongated, cylindrical, berry-like. Stemless plants, with long lineal grass-like leaves, wholly submerged. The staminate clusters being confined to the bottom by the shortness of the scape, the flower buds themselves break off from their short pedicels and float on the surface, where they shed their pollen around the fertile flowers which are raised to the surface by sudden growth at the same time; afterward the thread-form scapes (two to four feet long) coil up spirally,

drawing the fruit under water to ripen. Named for Ant. Vallisneri, an early Italian botanist.

*V. Spiralis*, L.:—Leaves linear, thin, long and ribbon-like (1—6° long), obscurely serrulate, obtuse, somewhat nerved, and netted-veined. Common in slow waters, New England to Florida, west to Minnesota and Texas.

Tribe STRATIOTEÆ, Richard:—American Frogbit.

*Limnobium*—Teal moss, grass or weed:—Flowers dioecious (or monœcious), from sessile or somewhat peduncled spathes; the sterile spathe one-leaved, producing about three long-pedicel flowers; the fertile two-leaved, with a single short pedicel flower; calyx three-parted or cleft; sepals oblong-oval; petals three, oblong-linear; filaments entirely united in a central solid column, bearing six to twelve linear anthers at unequal heights; there are three to six awl-shaped rudiments of stamens in the fertile flowers. Ovary six to nine celled, with as many placentæ in the axis, forming an ovoid many-seeded berry in fruit; stigmas, as many of the cells, but two-parted, awl-shaped. A stemless perennial herb, floating in stagnant water, proliiferous by runners, with long-petioled and round heart-shaped leaves, which are spongy-reticulated and purplish underneath; rootlets slender, hairy. Sterile flowers rather small, the fertile larger; peduncle nodding in fruit. Petals white (name from *λιμνοβίος*, living in pools).

*L. Spongia*, Richard:—Leaves 1—2' long, faintly five-nerved; peduncle of sterile flower about 3' long and filiform, of the fertile only 1' long and stout. Stagnant water, New Jersey to Florida, also Lake Ontario, Illinois and Missouri.

## Order GRAMINEÆ (Grass Family).

## Tribe ORYZEÆ.

*Zizania*:—Flowers monœcious; the staminate and pistillate both in one-flowered spikelets in the same panicle. Glumes two, subtended by a small cartilaginous ring, with a straight awl in the fertile spikelets; palet none; stamens six; stigmas pencil-form—large, often reed-like water grasses; spikelets jointed upon the club-shaped pedicels, very deciduous (adopted from *ζαζιτιον*, the ancient name of some wild grain).

*Z. aquatica*, L.—Indian Rice, Wild Rice:—Annual, culms 3—9° high; leaves flat, 2—3° long, lineal-lanceolate; lower branches of the ample pyramidal panicle staminate spreading, the upper erect, pistillate; lower glume long-awned, rough; styles distinct; grain linear, slender, 6" long. Swampy borders of streams and in shallow water; common, especially northward. August.

## AGROSTIDEÆ.

## CALAMAGROSTIS.

*C. Canadensis*—Blue-joint Grass:—Culm tall (3—5° high); leaves flat when fresh, glaucous; panicle oblong; glumes ovate-lanceolate, acute,  $1\frac{1}{4}$ — $1\frac{1}{2}$ " long; awn, from near the middle of the upper glume, not exceeding and scarcely stouter than the basal hairs.

*Deyeuxia Canadensis* (Hook f.):—Wet grounds; common northward. July.

*C. Confinis*, Nutt.:—Tall; panicle elongated (4—6'), its rather slender branches spreading at flower time, afterward appressed; glumes lance-oblong, very acute, 2" long, pale; hairs of the flower copious, equal, slightly or one-third shorter than the thin flowering glume and than those of the rudiment;

awn borne much below the middle of the glume, somewhat surpassing it; grain glabrous. *Deyouxia confinis* (Kunth). Swamps, Northern and Western New York (especially Penn Yan, Startwell) and Pennsylvania, Minnesota and westward. July.

LEERSIA, Swartz.—White Grass.

*L. Oryzoides*—Rice cut-grass:—Panicle diffusely branched; spikelets flat, rather spreading ( $2\frac{1}{2}$ —3" long), stamens three; glumes strongly bristly-ciliate (whitish). Very wet places; Massachusetts to Minnesota and southward; common. August.

*Elymus*, L.:—Wild Rye:—Spikelets two to four at each joint of the rachis of a terminal spike, all fertile and alike, sessile, each one to seven flowered. Glumes conspicuous, nearly side by side in front of the spikelets, two for each spikelet, forming an involucre to the cluster. Flower coriaceous; the glume rounded on the back, acute or awned at the apex. Grain adherent to the involving glume, whence the name, an ancient one for some grains (from  $\epsilon\lambda\nu\omega$ , to roll up).

#### SPIKE LARGE AND STOUT.

*E. Virginicus*, L.:—Culm stout, 2—3° high; spike rigidly upright, dense (2—3' long, 6" thick), the short peduncle usually included in the sheath; spikelets two to three together, two to three flowered, smooth rather short-awned, about the length of the thickened strongly-nerved and bristle-pointed lanceolate glumes. River banks; common. August.

*E. Canadensis*, L.:—Spike soon nodding (5—9' long), on an exerted peduncle; spikelets mostly in pairs, of three to five long-awned rough or rough-hairy flowers; the awl-shaped glumes tipped

with shorter awns. Variety *Glaucifolius* (Gray) is pale or glaucous throughout, the flowers with more spreading awns ( $1\frac{1}{2}'$  long). Variety *Intermedius* (Vasey) has the awns scarcely longer than the glumes. River banks; common.

SPIKE AND CULM MORE SLENDER.

*E. Sibericus*, L.:—Variety *Americanus*:—Glabrous; spike wand-like (2—6' long, 2—3" thick), often somewhat nodding; spikelets in pairs, three to six flowered; glumes linear-lanceolate, three to five nerved, acuminate and smooth or often scarbrous on the nerves, short-awned, shorter than the flowers, which bear an erect awn of once or twice their length. Michigan, Northern Minnesota and westward.

GLUMES AND PALET AWNLESS AND SOFT IN TEXTURE;  
REED-LIKE PERENNIALS.

*E. Mollis*, Trin.:—Culm ( $3^\circ$  high) velvety at top; spike thick, erect (8' long); spikelets two or three at each joint, five to eight flowered; the lanceolate pointed five to seven nerved glumes (1' long) and the pointed flowers soft-villous; rhachis of the spikelets separating into joints. Shores of the Great Lakes, Maine and northward.

ARUNDINARIA, Michx.—Cane.

*A. Macrosperma*—Large Cane:—Culms arborescent,  $10-40^\circ$  high and  $\frac{1}{2}-3"$  thick at base, rigid, simple the first year, branching the second, afterward at indefinite periods fruiting and soon after decaying; leaves lanceolate (1—2' wide), smoothish or pubescent, the sheath ciliate on one margin, stoutly fimbriate each side of the base of the leaf; panicle lateral, composed of a few

simple racemes; spikelets 1—3' long, purplish or pale, erect; flowering glume lanceolate, acute or acuminate, glabrous or pubescent, fringed (5—12" long). River banks, Southern Virginia, Kentucky and southward, forming canebrakes. April.

Variety *suffruticosa*, Munro.—Switch Cane, Small Cane:—Lower and more slender (2—10° high), often growing in water; leaves 4"—1' broad; spikelets solitary or in a simple raceme at the summit of the branches, or frequently on leafless radical culms. (*A. tecta*, Muhl.) Swamps and moist soil, Maryland, Indiana to Southeastern Missouri and southward. Sometimes fruiting several years in succession.

EQUISETACEÆ (Horsetail Family).

EQUISETUM—Horsetail, Scouring Rush.

*E. arvense*, L.—Common Horsetail:—Fertile stems (4—10' high) with loose and usually distant about eight to twelve toothed sheaths; the sterile slender (at length 1—2° high), ten to fourteen furrowed, producing long and simple or sparingly branched four-angular branches; their teeth four, herbaceous, lanceolate. Moist, especially gravelly soil; very common. March, May. Rootstocks often bearing little tubers.

*E. pratense*, Ehrh.:—Sterile and finally also the fertile stems producing simple straight branches; sheaths of the stem with ovate-lanceolate short teeth, those of the branches three-toothed; stems more slender and the branches shorter than in the last. Michigan to Minnesota and northward. April, May.

*E. palustre*, L.:—Stems (10—18' high) slender very deeply five to nine grooved, the ridges narrow and acute, roughish; the lance awl-shaped teeth whitish margined; branches always hollow, four to

seven angled, rather few in a whorl. Wet places, Niagara River, Wisconsin and northward. June.

*E. limosum*, L.:—Stems (2—5° high) slightly many-furrowed, smooth, sometimes continuing unbranched, but usually producing ascending branches after fructification; sheaths appressed, with ten to twenty-two (commonly about eighteen) dark-brown and acute rigid short teeth. In shallow water; rather common. Air cavities none under the grooves, but small ones under the ridges. A form in which the branches bear numerous small spikes is variety *Poly-stachyum*, Brückner. June, July.

*E. hyemale*, L.:—Scouring Rush, Shave-Grass:—Stems 1½—4° high, eight to thirty-four grooved, the ridges roughened by two more or less distinct lines of tubercles; sheaths elongated, with a black girdle above the base and a black limb; ridges of the sheaths obscurely four-carinate, the teeth blackish, membranaceous, soon falling off. Wet banks; common northward.

.. *E. robustum*, Braun.:—Stems tall and stout, sometimes 8—10° high and nearly an inch thick, twenty to forty-eight grooved, the ridges roughened with one line of transversely oblong tubercles; sheaths rather short, with a black girdle at base and a black limb; ridges of the sheaths tri-carinate, the blackish teeth soon falling off. River banks, Ohio and westward.

*E. lavigatum*, Braun.:—Stems 1—4° high, rather slender, pale green, fourteen to thirty grooved, the ridges almost smooth; sheath slightly enlarged upward, with a black girdle at the base of the mostly deciduous white-margined teeth, and rarely also at the base of the sheath; ridges of the sheath with one keel, or sometimes obscurely tri-carinate. By streams and in clayey places, Ohio to Minnesota and westward.

## TYPHACEÆ (Cattail Family).

TYPHA, Tourn.—Cattail Flag.

*T. latifolia*, L.—Common Cattail:—Stout and tall (4—6° high), the flat sheathing leaves 3—10" broad, exceeding the stem; the staminate and dark brown pistillate parts of the spike (each 3—6' long or more), usually contiguous, the latter at length 1' in diameter; pistillate flowers without bractlets; stigma rhombic-lanceolate; pollen grains in fours. In marshes, throughout North America.

*T. angustifolia*, L.:—Leaves narrower (3—6" broad, taller, somewhat convex on the back; pistillate and staminate inflorescence usually separated by a short interval, the light-brown spike becoming 5—6" in diameter; pollen-grain simple; pistillate flowers with a lineal stigma and a hair-like bractlet slightly dilated at the summit. New England to New Jersey, west to Michigan and Missouri; less frequent, and mainly near the coast.

JUNCACEÆ, Tourn. (Rush, Bog Rush).

JUNCUS.

*J. effusus*—Common or soft rush:—Very common in marshy ground and in still waters. Description well known.

POLYGONACEÆ (Buckwheat Family).

POLYGONUM, Tourn.

*P. hydropiperoides*, Michx.—Mild Water Pepper:—Perennial, not acrid; stem smooth (1—3° high), branching; the narrow sheaths hairy; leaves narrowly lanceolate, sometimes oblong; spikes erect, slender, sometimes filiform, often interrupted at base (1—2½' long); flowers small, flesh-color or nearly white; sepals not dotted; stamens eight; achene sharply

triangular, smooth and shining. Wet places and in shallow water; common, especially southward.

*P. acre*, H. B. K.—Water Smartweed:—Perennial, nearly smooth; stems rooting at the decumbent base, 2—5° high; leaves larger and longer than in the last, taper-pointed; spikes erect; flowers whitish, sometimes flesh-color; stamens eight; style mostly three-parted; achene smooth and shining. Wet places; common, especially southward.

IRIDACEÆ (Iris Family).

IRIS, Tourn.—Flower-de-luce.

*I. Versicolor*, L.—Larger Blue Flag:—Stem stout, angled on one side; leaves sword-shaped ( $\frac{3}{4}$ ' wide); ovary obtusely triangular, with the sides flat; flowers  $2\frac{1}{2}$ —3' long) short-peduncled; the funnel-form tube shorter than the ovary; capsule oblong, turgid with rounded angles. Wet places, Newfoundland to Florida, west to Minnesota and Arkansas. May, June.

NYMPHÆACEÆ (Water-lily Family).

NELUMBO, Tourn.—Sacred Bean.

*N. Lutea*, Pers.—Yellow Nelumbo or Water Chinquapin:—Leaves usually raised high out of the water, circular, with the center depressed or cupped, 1—2° in diameter; flower pale yellow, 5—10' broad; anthers tipped with a slender hooked appendage. *Nelumbium luteum* (Willd.). Southern Connecticut (probably of Indian introduction) to Lake Ontario, Michigan, Minnesota, Eastern Nebraska and southward, Illinois and Indiana. Tubers farinaceous and edible. Seeds also eatable. Embryo like that of *Nymphaea* on a large scale; cotyledons thick and fleshy, enclosing a plumule of one or two well-formed young leaves enclosed in a delicate stipule-like sheath.

*N. Reniformis*.—(D. C. Tuber-bearing W.) :—Leaves reniform-orbicular, mostly larger (8—15' wide) and more prominently ribbed than the last, rarely purplish beneath; rootstock bearing numerous spontaneously detaching often compound tubers; flowers scentless (or with a slight odor as of apples), white, never pinkish,  $4\frac{1}{2}$ —9' in diameter, the petals proportionally broader and blunter than in *N. odorata* (sweet-scented water-lily); the fruit more depressed and with fewer, but much larger (i. e., twice as broad) globular-ovoid seeds, which when mature are barely enclosed by the aril and not stipitate.

*N. Tuberosa*, Paine. Lakes, slow rivers, etc. Western New York, from Oneida Lake (Paine), and near Meadville, Pa., to Michigan, Eastern Nebraska and probably in the Southern States. July, September.

NUPHAR, Smith.—Yellow Pond Lily.

*N. adventa* (Ait f.) :—Sepals six, unequal; petals shorter than the stamens and resembling them; thick and fleshy, truncate; stigma nearly entire, twelve to twenty-four rayed, pale red; ovary and fruit ( $1\frac{1}{2}$  long) ovate, not contracted above into a narrow neck (6—12' long) from roundish to ovate or almost oblong, the sinus open, or closed or narrow. Very common in still or stagnant water; stout and coarse; flower often partly purplish. Variety *Variegatum*.

*N. Kalmianum*, Ait. :—Very slender and with slender rootstock; submersed leaves thin, round-reniform, the floating broadly elliptical with a deep narrow sinus, 2—4' long; sepals usually five, the flowers an inch broad or less; petals spatulate or obovate; stigmas seven-ten rayed, dark red; fruit globular, with

a short neck 6—9" in diameter. *N. luteum*, variety *pumilum* (Man.). Maine to Pennsylvania and Minnesota and northward.

*N. sagillifolium*, Pursh:—Rootstock stout, leaves narrowly oblong to oblong-lanceolate, with a short sinus, 6—15' long; flowers small (1' broad). Southern Indiana and Illinois (Schneck), and southward.

#### LEMNACEÆ (Duckweed Family).

LEMNA, L.—Duckweed, Duckmeat:—Ovule solitary, orthotropous or nearly so; frond one to three nerved, thin.

*L. trisulca*, L.:—Fronds oblong to oblong-lanceolate (6—9" long), attenuate at base into a slender stalk denticulate at the tip, very obscurely three-nerved, often without rootlets, usually several series of offshoots remaining connected; spathe sac-like; seeds ovate, amphitropous, with small round operculum. Ponds and springy places, Nova Scotia to New Jersey, west to the Pacific.

*L. Valdiviana*, Philippi.—Fronds elliptic-oblong, small (about 1" long), rather thick, utricle long ovate, pointed by the long style; seed orthotropous, oblong, with a prominent acute operculum. *L. Torreyi* (Austin). Pools, New Jersey and southward, westward across the continent.

*L. perpusilla*, Torr.:—Fronds obovate or roundish obovate, oblique (1—1½" long), obscurely three-nerved; utricle ovate; style rather long; seed orthotropous, ovate or oval, obtuse, with scarcely apiculate operculum. New York and New Jersey, west to Michigan and Wisconsin. Variety *Trinervis* (Austin) has larger, distinctly three-nerved fronds, and an unequally cordate seed.

*L. Minor*, L.:—Fronds round to elliptic obovate (1—2½" in diameter), rather thick, very obscurely three-nerved; spathe sac-like; utricles short urn-shaped, tipped with a short style; seed oblong-obovate, amphitropous; with prominent rounded operculum. Stagnant waters, throughout North America.

ALISMACEÆ (Water Plantain Family).

*ALISMA*, L.—Water Plantain.

*A. Plantago*, L.:—Perennial by a stout proliferous corm; leaves long-petioled, ovate, oblong, or lanceolate or even linear, acute, mostly rounded or heart-shaped at base, three to nine nerved; panicle loose, compound, many-flowered (1°—2° long), carpels obliquely obovate, forming an obtusely triangular whorl in fruit. Shallow water and ditches; very variable as to foliage, but the leaves usually more broadly cordate-ovate than in old world forms. Variety *Americanum* (R. and S.) when growing under water thinner and narrowly lanceolate.

NAIADACEÆ (Pondweed Family).

JUNCAGINEÆ:—Marsh plants, with terete bladeless leaves; flowers perfect, spicate or racemose, with herbaceous six (rarely three) lobed perianths; carpels three or six, more or less united, separated at maturity. Seeds anatropous, embryo straight.

*Triglochin*, L.:—Arrow grass. *T. palustris*, L.

NAIADEÆ:—Immersed aquatics, with flat leaves, ovaries solitary or distinct, one-ovuled.

POTAMOGETON, Tourn.:—Pondweed.

*P. Natans*, L. *P. Pennsylvanicus*, Cham. *P. Illinoisis*, Morong:—Ponds and stagnant water; common.

Order SELAGINELLACEÆ.

*ISOETES*:—Aquatic or growing in mud; stems corn-like; leaves elongated and rush-like, sporangia very large, enwrapped by the dilated bases of the leaves.

*I. lacustris*:—Mountain lakes, Pennsylvania, New York and New England, Lake Superior and northward.

*I. echinospora*, variety *Braunii*:—Ponds and lakes, New England, New York, Pennsylvania and northward.

*I. riparia*:—Margin of pools, Connecticut and northward, gravelly banks of Delaware.

*I. Engelmanni*:—Shallow ponds, Massachusetts, Connecticut, Pennsylvania and Middle States.

*I. Melanopoda*:—Shallow ponds, Central and Northern Illinois and westward.

Order SALVINIACEÆ.

*AZOLLA*—Small moss-like plants; the stems pinnately branched, covered with two-lobed imbricated leaves, and emitting rootlets on the under side. Conceptacles in pairs beneath the stem; the smaller ones acorn-shaped, containing at the base a single macrospore with a few corpuscles of unknown character above it; the larger ones globose, and having a basal placenta which bears many pedicellate microsporangia which contain masses of microspores.

*A. Caroliniana*:—Floating on quiet waters, from Lake Ontario westward and southward, appearing like a reddish hepatic moss.

Order ELATINACEÆ (Waterwort Family):—Little marsh annuals, with membranaceous stipules between the opposite dotless leaves; minute axillary flowers like those of the chickweeds, but the pod two to five celled and the seeds as in St. Johnswort.

*Elatine Americana*:—Margin of ponds, etc., New Hampshire to Illinois, Virginia and southward.

*E. triandra*:—Ponds, Illinois, Nebraska and westward.

*E. brachysperma*:—Illinois and southward.

Order HALORAGEÆ (Water Milfoil Family):—Aquatic or marsh plants (at least in northern countries), with the inconspicuous symmetrical (perfect or unisexual) flowers sessile in the axils of leaves or bracts, calyx-tube coherent with the ovary.

MYRIOPHYLLUM—Water Milfoil.

*M. Spicatum*:—Deep water, Newfoundland to New England and New York, west to Minnesota, Arkansas and the Pacific.

*M. Verticillatum*:—Ponds, common.

*M. heterophyllum*:—Lakes and rivers, Ontario and New York to Florida, west to Minnesota and Texas.

*M. Scabratum*:—Shallow ponds, New England to South Carolina, west to Missouri and Louisiana.

*M. ambiguum*:—Ponds and ditches, Massachusetts to New Jersey and Pennsylvania, also Indiana.

*M. tenellum*:—Borders of ponds, Newfoundland to New England, west to Michigan.

CALLITRICHE—Water Starwort.

*C. verna*:—Common in stagnant waters, Pennsylvania, New Jersey to Florida, west to Minnesota, Texas and the Pacific.

*C. heterophylla*:—Stagnant water, New York and New Jersey, Indiana and Missouri.

*C. Autumnates*:—West Massachusetts, Lake Champlain, New York, Lake Superior and westward.

Order LENTIBULARIACEÆ:—Small herbs (growing in water or wet places) with a two-lipped calyx, and a two-lipped personate corolla, two stamens (confluently), one-celled anthers, and a one-celled

with a free placenta, bearing several anatropous seeds, with a thick straight embryo and no albumen.

UTRICULARIA—Bladder-wort.

*U. inflata*:—Still water, Maine to Texas near the coast.

*U. clandestina*:—Ponds, from New Brunswick and New England to New Jersey, near the coast.

*U. vulgaris*:—Common in ponds and slow streams, Newfoundland to Minnesota, south to Virginia and Texas, and westward.

*U. minor*:—Shallow water, Massachusetts to Minnesota, south to New Jersey and Arkansas.

*U. biflora*:—Ponds and shallow water, South Illinois and Iowa to Texas, also South Virginia.

*U. gibba*:—Shallow water, Massachusetts to Michigan, south to Virginia and Illinois.

*U. fibrosa*:—Shallow pools in pine barrens, New Jersey to Florida and Alabama.

*U. intermedia*:—Shallow pools, Newfoundland to New Jersey, west to Iowa, Minnesota and northward.

*U. purpurea*:—Ponds, Maine and North Pennsylvania to Florida, near coast, also Lake County, Indiana.

*U. resupinata*:—Sandy margins of ponds, Maine to Rhode Island, near the coast, also North New York and Lake Erie.

Order PONTEDERIACEÆ:—Aquatic herbs, with perfect, more or less irregular flowers from a spathe; the petal-like six-nervous perianth free from the three-celled ovary; the three or six, mostly unequal or dissimilar, stamens inserted on its throat.

PONTEDERIA—Pickerel weed.

*P. cordata*:—Nova Scotia to Florida, west to Minnesota and Texas.

HETERANTHERA—Mud Plantain:—Creeping, floating or submerged low herb, on mud or shallow water, with a one few-flowered spathe bursting from the sheathing side or base of a petiole.

*H. reniformis*:—Connecticut to New Jersey, west to Illinois and Eastern Kansas, southward.

*H. limosa*:—Virginia to Missouri and Louisiana.

*H. graminea*:—New England to North Carolina, west to Minnesota and Eastern Kansas.

Order MAYACEÆ:—Moss-like aquatic plants, densely leafy, with narrowly-linear sessile pellucid leaves, axillary naked peduncles terminated by a solitary perfect three-androus flower, herbaceous calyx, white corolla, and a three-valved one-celled several seeded capsule.

MAYACA.

*M. Michauxii*:—Virginia to Florida and Texas.

Order GENTIANACEÆ.

LIMNANTHEMUM—Floating Heart.

*L. lacunosum*:—Shallow water, Maine to Minnesota, south to Florida and Louisiana.

*L. trachyspermum*:—Ponds and streams, Maryland to Virginia, Florida to Texas.

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