

New York State Department of Environmental Conservation

MEMORANDUM

TO: Wildlife Managers, Regions 1-9  
FROM: Bryan Swift  
SUBJECT: Request for Biological Data on Canada Geese in the 1989-90 Harvest  
DATE: August 28, 1989

1/7

I would like to request that age, sex, and morphological measurements (culmen and tarsus) be recorded from Canada geese harvested in areas where you normally conduct waterfowl bag-check operations. This should include at least the Tonawanda/Oak Orchard/Iroquois complex, King Ferry Co-op, Perch River, and Wilson Hill. If possible, I would also like to collect the same information by solicitation among waterfowlers in the Hudson Valley and Long Island. There are two important reasons for this request.

1. As discussed in the attached report from Rich Malecki, indications are that geese in northern Quebec (where we get most of our migrants), experienced a "bust" in production, with essentially no young being produced. I would like to know as soon as possible if this was the case, using age ratios in the harvest as an indicator. If production was poor, we can expect the Atlantic Flyway mid-winter count to be down again, and harvest reduction measures will be called for in 1990-91. If there are virtually no young "migrants" in the harvest, which I believe is unlikely, I may recommend that action be taken this year, such as reducing the bag limit to 1 or 2 for the remainder of the season, or early closure, in some or all zones. Please consider this possibility, but don't panic.

2. We now have at least 2 years of data on morphological measurements from "resident" Canada geese in New York and other states in the Northeast, and from migrant geese in northern Quebec. By taking measurements from geese in the harvest, it is possible to estimate the proportion derived from each source. This is important if we hope to maximize hunting opportunities on resident geese, while protecting migrant flocks. I can provide details to anyone who's interested.

The approach I'd like to take is to sample at least 50 harvested geese from each of the following areas during October: western New York, central New York, northern New York, and Hudson Valley. Age and sex should be determined for all geese that come through an existing check station, and culmen and tarsus should be measured on all adults. I'll be working with Sal Cozzolino and Regions 3 and 4 to come up with a Hudson Valley sample. In addition, I'd like to request a second sample in January from central New York, Hudson Valley, and Long Island for comparative purposes.

For now, I'd like to alert you to the concern, and ask for some response by September 15 whether you can provide a fall and/or winter sample of harvested Canada geese. I can provide any necessary procedural details, including a data sheet, once I hear back from everyone. Please feel free to call if you have any questions, and let's hope the migrant geese are in better shape than it appeared in July.

*Bryan*

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Senior Wildlife Biologist  
Game Bird Unit

BLS:dd

Attachment

cc: K. Wich

G. Parsons

E. Fried

J. Glidden

S. Cozzolino

NEW YORK COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT  
DEPARTMENT OF NATURAL RESOURCES  
FERNOW HALL, CORNELL UNIVERSITY  
ITHACA, N. Y. 14853

*Cooperating Agencies:*

CORNELL UNIVERSITY  
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
WILDLIFE MANAGEMENT INSTITUTE  
U.S. FISH AND WILDLIFE SERVICE

August 2, 1989

MEMORANDUM

TO: Cooperators, Canada Goose Project  
FROM: Rich Malecki  
SUBJECT: Summer Banding

The summer banding of Canada geese in northern Quebec did not go as well as expected. My intent this year was to leg- and neckband a large sample of adult and young-of-the-year birds on the western side of the Ungava peninsula. This is a region that we identified from last year's spring breeding pair survey as containing a significant portion of the Atlantic flyway breeding population (see Fig. 1; Region 2 comprised 7% of the survey area and 56% of the breeding pair estimate). The banding crew was based out of Inukjuak for 3 days (July 18-20). We thoroughly covered the land area within a 60-80 mile radius of this settlement and did not band a single bird. All indications are that geese in this region experienced a "bust" in production with essentially no young being produced.

Many small groups of adults (5-40 birds) without young were encountered during our flights in the Inukjuak region. A typical 2-hour flight resulted in the following sightings:

Adults w/o young

20-22-28-15- 6-37- 4-38-20  
25-30-15- 7-25-12-10-12-15  
10-40-30-25-15-30-15-15-25  
5-20-12-40-12-35-25-20- 6  
30-20-50- 5-25-10-20-35-15  
12-20- 8-10-30-50-20-15- 6  
10-10-35-15-20-25-40-11-20  
12- 5-10-15-10-10-10-10-30  
10-20- 5-25-20-10-20-15-16  
30-30-20- 8-25-12

n = 87 groups

Pairs w/young

3/4 - 1/2 - 1/1  
2/2 - 3/5 - 5/14  
1/2

n = 16 pairs w/32 young

MEMO TO: Cooperators, Canada Goose Project  
August 2, 1989  
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As indicated, adults with young occurred infrequently and not in sufficient numbers to make banding feasible. Additionally, the young were very small; many being too small to hold a legband. The groups of adult birds without young were not the typical groups of 100-200 geese often characteristic of molt migrants. I am confident that these groups represented "nest-fail" adults and that most females showed the remnants of a brood patch. The banding we did in the Fort Chimo area supports this.

In the Fort Chimo (Kuujjuaq) area, on the southern edge of Ungava Bay, we banded 1,386 birds. This total included 611 adults and 775 young-of-the-year. No neckbands were placed on geese. The reason for this was the need to obtain an adequate sample of legbanded birds to reliably estimate survival rates for juveniles from band recoveries.

Production of geese in the Fort Chimo region was sufficient to obtain a legband sample, but not adequate to warrant much optimism. In the tundra region to the north of this settlement we recorded sightings similar to those near Inukjuak; small groups of adults with no young. East of Fort Chimo we also encountered many adults with no young. However, near the mouths of 3 river systems, we did find adults that were successful. The young were small, many being just large enough to hold a band. They were obviously the result of a late nesting effort. The sheltered river systems that these successful birds were associated with are not typical of most of this area. Therefore, I believe we were dealing with a few local areas that did okay.

#### What happened?

In mid-May, reports from northern Quebec indicated that little snow was on the ground and an early spring was expected. Then, in late-May, a major snowstorm hit the Ungava peninsula. The USFWS 1989 Status Report indicates as much as 45 cm (18 inches) of snow fell, much of which lasted into early June. Reports from the weather station in Inukjuak indicate less snow in this area, but suggest poor conditions existed over a fairly long period.

Inukjuak Weather Records (1989)

<u>May</u>	<u>Mean temp (°F)</u>	<u>Rain (mm)</u>	<u>Snow (cm)</u>
26	48	Tr	0
27	35	9.4	3.4
28	28	0	2.0
29	28	0	2.0
30	29	0	2.4
31	29	Tr	0.2

June

1	30	Tr	Tr
2	33	Tr	0.8
3	33	Tr	0.6
4	33	0	Tr
5	33	0	0.6
6	40	1.0	0.4

In the Fort Chimo region, weather conditions were not quite as severe. However, the same pattern of freezing snow and rain was apparent.

My guess is that the majority of geese on the Ungava peninsula initiated nesting during the favorable conditions that existed in mid-May. These birds were then forced to abandon their nests during the prolonged period of inclement weather. My experience in northern nesting areas has been that a goose in good condition can tolerate a substantial amount of cold weather and snow. However, the prolonged period of rain and snow that occurred (almost 12 days) was probably too much. Some of the females that we did band with young this year were extremely light in weight. This again suggests the energetic drain that these birds experienced.

Fall Flight

I anticipate very few immature birds in this year's fall flight. Our efforts to band geese on both sides of the peninsula, in conjunction with knowledge gained from last year's breeding pair survey, allows me to state this with a fair degree of confidence. The ratio of immature:adult geese in last year's harvest was one of the lowest on record. Any harvest that occurs this year should reflect a much lower rate.

MEMO TO: Cooperators, Canada Goose Project  
August 2, 1989  
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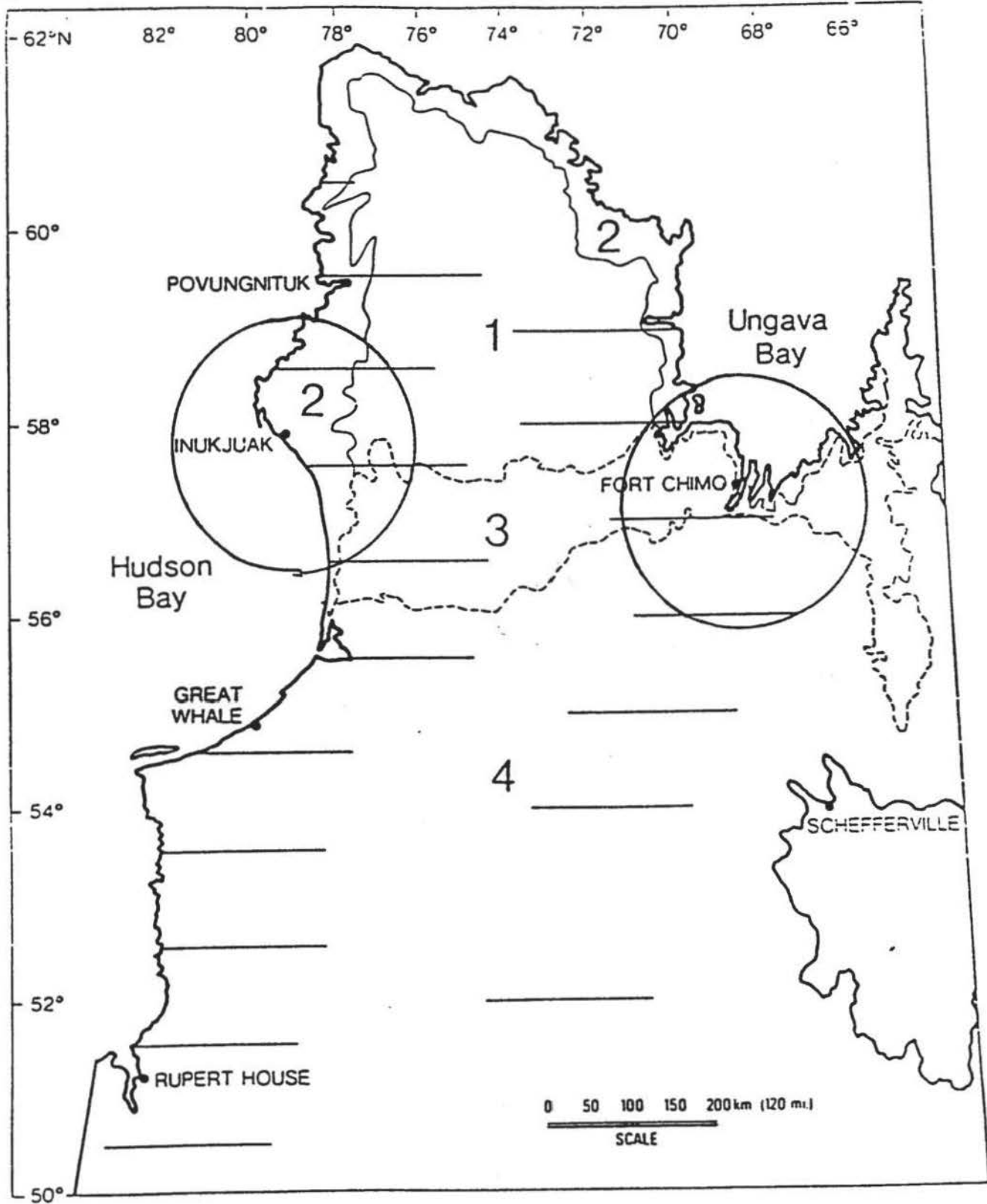
We are essentially looking at 3 consecutive years of poor production from northern Quebec. This is something that is not evident in any past records for this population. With each year in which few young are produced, we remove through harvest a higher proportion of the adult breeding component of the population and the number of subadults that are approaching breeding age. The loss of the immature cohort will also be evident in the recruitment of new breeders 3, 4, and 5 years from now. The decline we are presently experiencing in this population, as evidenced by the mid-winter survey, can be expected to continue into 1990. The magnitude of the decline seen this winter will depend on how extensive the harvest is and, to a lesser extent, on the production and availability of resident geese to help buffer that harvest.

RAM/ded

Enclosure

A handwritten signature in dark ink, appearing to read "Rick M.", is located to the right of the typed name "RAM/ded". The signature is fluid and cursive.





7/7 Figure 1

**New York State Department of Environmental Conservation**

Don Tiller  
Inauguration NWR

## MEMORANDUM

(2307 - 11272)

TO: Distribution  
FROM: Bryan Swift  
SUBJECT: Instructions for Collecting Biological Data on Canada Geese  
DATE: October 2, 1989

1/18

For those of you who indicated that you or your staff would be able to collect age, sex, and morphological data on Canada geese killed by hunters this fall, I prepared a data sheet and instructions for that purpose (enclosed). Please submit all information to me accordingly. Also enclosed are two references for aging and sexing Canada geese; if you need any other information, don't hesitate to call. Your assistance is appreciated, and I'll inform you of the results as soon as I can.

Bryan

Senior Wildlife Biologist  
Game Bird Unit

BLS:dd

Enc.

Distribution: Regional Wildlife Managers  
G. Hocutt  
D. Tiller  
S. Cozzolino

cc: G. Parsons  
E. Fried  
J. Glidden  
J. Smith  
D. Nash

RECEIVED

OCT 10 1989

## IROQUOIS NWR

X.O.	Refuge Manager	.DT.
X.Q.	Assist. Mgr. 1	.R.
X.Q.	Assist. Mgr. 2	.....
X.Q.	Wildl. Biologist	.....
.....	Secretary	.....
.....	Auto. Mechanic	.....
.....	Maint. Worker	.....
X.Q.	Tractor Oper.	.....
.....	.....	.....
.....	.....	.....

X	Action
✓	File
O	Review
✓✓	Discuss
T	Toss

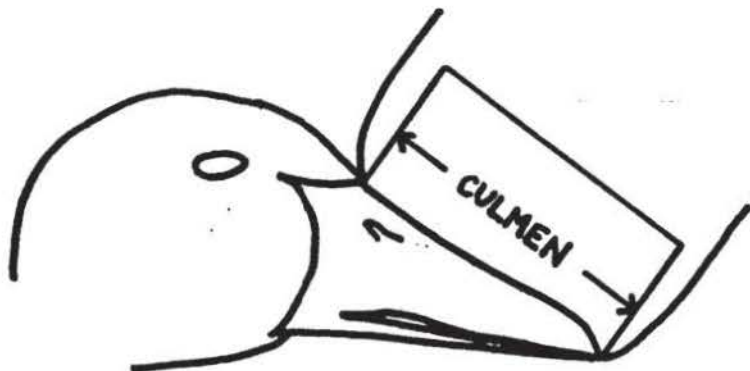


# CANADA GOOSE BAG CHECK INSTRUCTIONS

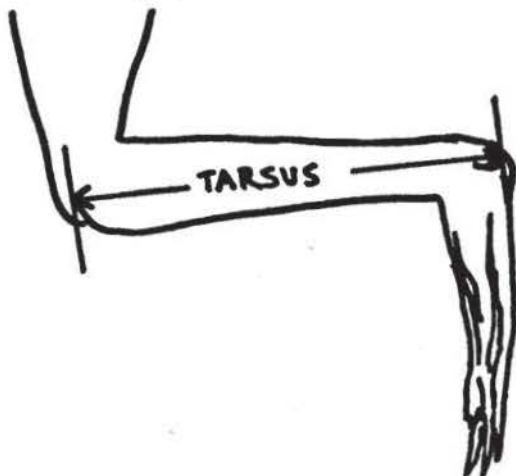
Fill out data sheet completely!

1. Record legband # and/or neckband color and # if present.
2. Record date of kill.
3. Determine age (by tail feathers) and sex (by cloacal exam) of all geese checked! Use standard USFWS age codes (HY, AHY, U - unknown) and M or F for sex.
4. Take measurements from adult (AHY) geese only. Measure to the nearest 0.1 mm, and record the measurer's name or initials.
5. Determine Latitude-Longitude of kill locations, and identify by name or nearest village, etc.
6. Return completed sheets at the end of each month to Bryan Swift, NYSDEC-Game Bird Unit, Wildlife Resources Center, Delmar, NY 12054. If any problems or questions arise, feel free to call me at (518) 439-0725.

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To measure culmen: Measure from tip of culmen to first feather or feather follicle on midline of bill. Make sure the tip of the calipers is at the tip of the bill.



To measure tarsus: On the outside of either leg, locate a notch at each end of the tarsus bone; these are usually 1-2 mm from the outermost point of the leg (including joint and skin). The caliper should be snug in these two notches for this measurement.



RECEIVED  
OCT 1 1969  
BUREAU OF WILDLIFE  
D. E. C. REG. #8



CANADA GOOSE (CAGO)  
*Branta canadensis*Sp. no. 172.0  
Band size 8

## KEY TO AGE AND SEX:

- 1A Some or all tail feathers blackish-brown with notched, worn tips and relatively narrow vanes.....HY SY (see 2 only)
- 1B All tail feathers black with unnotched, unworn tips and relatively broad vanes.....See 2
- 2A(1) Penis present.....Male (see 3)
- 2B Penis absent.....Female (see 4)
- 3A(2) External portion of sphincter muscle pale flesh colour: penis intermediate in size size of exposed lead of sharpened pencil, usually pale flesh colour, translucent and smooth: bursa open and easily probed, usually to depth of 15-20 mm: spur of each wing smooth and feathered over at tip.....L HY SY
- 3B External portion of sphincter muscle dark red or purple: penis large, dark red or purplish with wrinkled surface and fairly prominent venation: bursa closed, or if open, shallow and probed with difficulty: tip of each wing spur enlarged, knobby at tip, more or less denuded of feathers.....AHY ASY
- 4A 2) External portion of sphincter muscle light flesh-red in colour: oviduct closed at juncture with cloaca: bursa open and easily probed, usually to depth of 15-20 mm.....L HY SY
- 4B External portion of sphincter muscle dark red or blotched with purple: oviduct open and easily probed: bursa closed, or if open, shallow and probed with difficulty.....AHY ASY

(NOTES ON SPRING AND SUMMER BIRDS: Birds with partially open bursa and normal uninjured wing spur may be classed during summer as AHY ASY. Males lacking bursa and having enlarged, knobby wing spurs are older than two years. Females with open oviducts, partially open bursa, and small or absent brood patch are AHY ASY. Older females have flaccid, easily distended sphincter muscle, enlarged oviduct opening, closed bursa, and prominent brood patch during breeding season.)

MOLTS: Post-juvenile complete, Jul.-Jan.; post-nuptial complete, Jun.-Jul.

(continued)

INCUBATION: 28-30 days. FLYING YOUNG: 50+ days. BANDING: 40+ days.

REFERENCES: Arthur 1974. pers. comm. BBL.; Dill and Lee 1970. Homegrown honkers. USDI.; Hanson 1962. Ill. Biol. Notes No. 49; Williams. 1967. Honker. D. Van Nostrand and Co., Inc.

USUALLY ACCEPTABLE AGE-SEX CODES BY MONTH

AGE - SEX	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
L-U/M/F												
HY-U/M/F												
SY-U												
SY-M/F												
AHY-U												
AHY-M/F												
ASY-M/F												
U-U												

Canada Goose codes.



STATE OF ILLINOIS  
DEPARTMENT OF REGISTRATION AND EDUCATION

# CHARACTERS OF AGE, SEX, AND SEXUAL MATURITY IN CANADA GEESE

HAROLD C. HANSON

Biological Notes No. 49

November, 1962

RECEIVED

NATURAL HISTORY SURVEY DIVISION

Urbana, Illinois

# CHARACTERS OF AGE, SEX, AND SEXUAL MATURITY IN CANADA GEESE

HAROLD C. HANSON

The base upon which the year-to-year management of a wild goose population must rest is a collection of accurate data on the age and sex of individuals in the population. Age and sex data collected during the fall and winter period can be used to make fairly accurate estimates of the productivity of a population in the previous nesting season and the probable number of geese that will be returning to the wintering grounds in the following autumn (Hanson & Smith 1950:170-1, 192). The validity of these estimates is in large measure dependent on the ability to distinguish yearling adults from older adults as well as from immatures. External morphological criteria useful in aging and sexing Canada geese, *Branta canadensis*, in autumn and winter were summarized earlier (Hanson 1949). Subsequent studies on both the wintering and breeding grounds have provided additional criteria and established their relative values at various seasons of the year.

## ACKNOWLEDGMENTS

In making the studies reported here, the writer received the support of many organizations and individuals. Studies at the Horseshoe Lake State Wildlife Refuge, Alexander County, Illinois, benefited greatly from the outstanding facilities and co-operation provided by the Illinois Department of Conservation. Field studies conducted in the Hudson-James Bay region of northern Ontario, on the breeding grounds of the Mississippi Flyway population of Canada geese, *Branta canadensis interior*, were made possible by a series of grants from the Arctic Institute of North America. Logistic support was provided by the Ontario Department of Lands and Forests. An opportunity to study the population of *Branta canadensis maxima* wintering at Rochester, Minnesota, was offered by the Minnesota Department of Conservation and the U.S. Bureau of Sport Fisheries and Wildlife. (Prior to the writer's rediscovery of this race in January, 1962, *B. c. maxima* had been thought to be extinct since about the turn of the century.) Studies of skin collections were made at the American Museum of Natural History, the National Museum of Natural History, and the Chicago Museum of Natural History. The interest and encouragement of Dr. Thomas G. Scott, Head of the Section of Wildlife Research, Illinois Natural History Survey, has been important to the success of the author's long-term study of the Canada goose. The presentation of the findings has

benefited from the reviews of the editorial board of the Section of Wildlife Research and the editing of James S. Ayars, Technical Editor of the Natural History Survey.

Dr. A. V. Nalbandov of the College of Agriculture, University of Illinois, kindly provided the gonadotropic hormone used in an experiment mentioned later in this paper.

The photograph used for the cover of this publication shows Canada geese on Horseshoe Lake, Alexander County. This and most other photographs reproduced here were taken by the author; photographs for figs. 9 and 11 were made by Wilmer D. Zehr, Natural History Survey photographer.

## MATERIALS AND METHODS

Present findings are based on trap and/or bag samples of Canada geese at Horseshoe Lake, Alexander County, Illinois; at Rochester, Olmsted County, Minnesota; in northern Ontario along the Sutton River, fig. 1, which drains into Hudson Bay; and on Akimiski Island, fig. 13, in James Bay.

In the subsequent discussions, the following age classification is used for Canada geese during the fall and winter period: *immatures*, 5-8 months of age; *yearlings*, 17-20 months of age; and *adults*, 29 or more months of age. During the spring and summer, four age classes of Canada geese can be recognized: *goslings*, *yearlings*, *2-year-old adults*, and *old adults* (not all 2-year-old geese can be separated from older adults). Except as noted, the discussions below pertain to sexing and aging geese during the fall and winter period.

Immature Canada geese can be separated from older geese on the basis of plumage characters alone, but, for the identification of yearlings and for sex determination, the cloaca must be inspected. Another character useful in age and sex identification is the extensor portion of the carpometacarpus of the wing which, in the male, tends to form a bony spur or knob as the bird ages.

## PLUMAGE CHARACTERS

The tail feathers, the primary feathers of the wing, and the feathers of the breast and belly are all useful in determining age in Canada geese.

**Tail Feathers.**—The frayed or notched tip in the tail feathers of immatures, shown to be of value by Schioler (1924), has been widely employed by waterfowl biologists as a criterion of age (Elder 1946:98;



Hanson 1949:179), fig. 2. In most instances, the tail feathers of the first postnatal plumage may be readily differentiated from those of the adult plumage by their narrower, more tapered outline and their less intense pigmentation. During the winter, the tail feathers of the immature plumage are gradually replaced by the longer, broader, and more deeply pigmented tail feathers characteristic of adult plumage. The tail feathers are generally replaced two at a time, beginning with the central pair. In immature Canada geese in southern Illinois, replacement of tail feathers in winter is largely limited to the central two or three pairs. Observations made in early May, 1959, on the

breeding grounds of these geese in northern Ontario, revealed that the tail feather criterion of age could be employed, with nearly comparable accuracy, during the migration period, the last half of April and the first half of May. Most yearlings retained some immature type tail feathers until the onset of the molt.

The above findings apply particularly to *Branta canadensis interior* of the Mississippi Flyway. That they do not apply equally well to all races of Canada geese became apparent in late January, 1962, when 100 individuals of the subspecies *B. c. maxima*, the giant Canada goose, were examined by the writer at their major wintering area, the city park of Rochester,

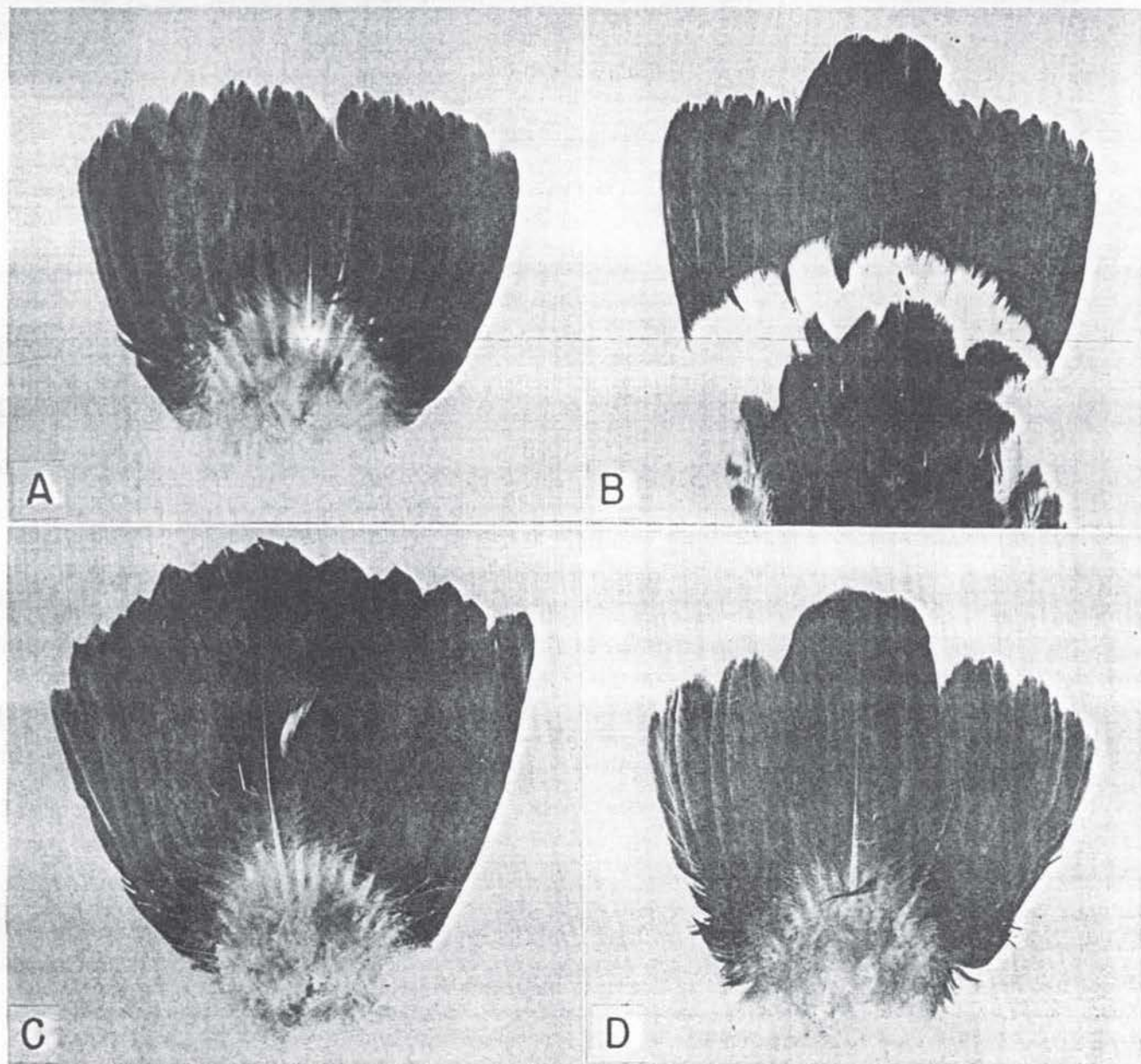


Fig. 2.—Tail feathers of Canada geese: A and B, immatures in winter; C, adult in winter; D, immature in early May. A notched tip is evident in most of the feathers of the immatures.



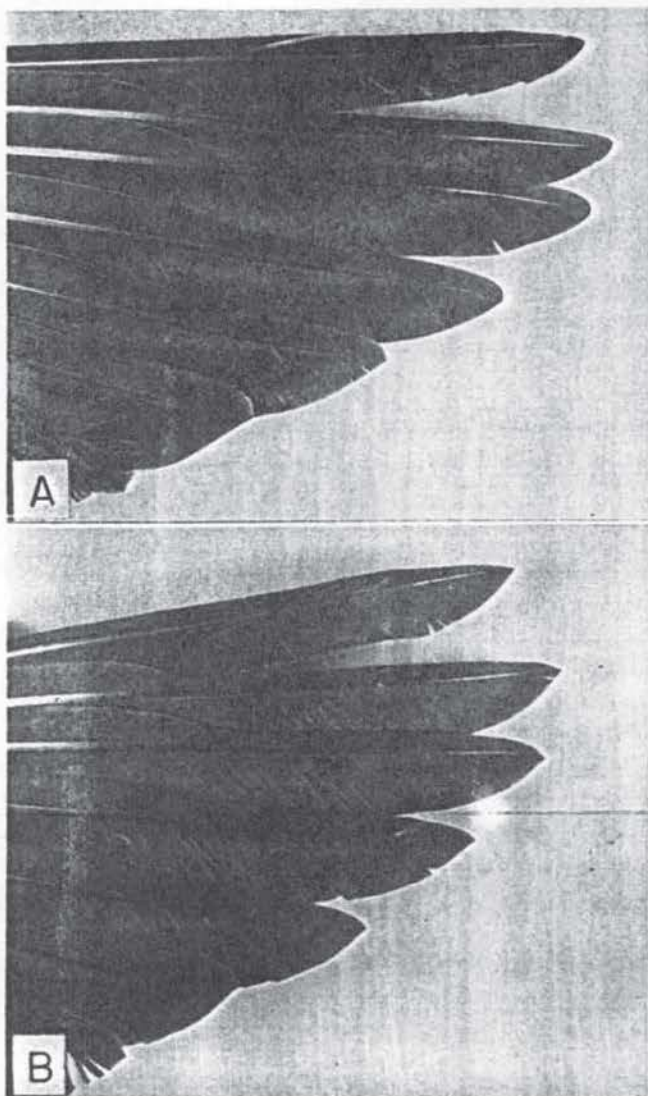


Fig. 3. — Primary feathers of an adult Canada goose, A, and an immature, B, in winter. Feather tips of the adult are rounded; those of the immature are pointed.

Minnesota, and the nearby surrounding countryside. Plumage characters of the immature *B. c. maxima* at Rochester revealed these geese to be in a much more advanced stage of development at a comparable date than the immatures of *B. c. interior* in southern Illinois. The tail molt was especially well advanced in the Minnesota birds; at least 5 of the 40 immatures examined had a complete set of adult-type tail feathers. This difference is not surprising, as the geese that nest on Dog Lake in central Manitoba, and that have recently been identified as *B. c. maxima*, begin nesting (Klopman 1958:169) at least a month earlier than *B. c. interior*, which nests in the Hudson Bay lowlands of northern Ontario and Manitoba. It is advisable to consider both the nesting phenology and the characteristics of the individuals of populations before using collections of tail feathers to obtain age ratios.

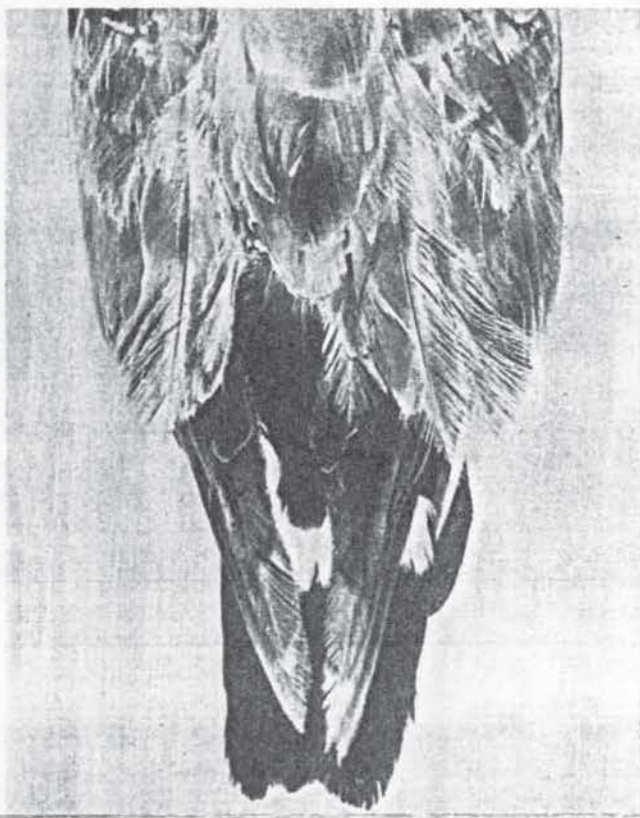


Fig. 4. — Dorsal view of lower back and tail of a lesser Canada goose, *Branta canadensis parvipennis*, shot at Perry River, Northwest Territories, on July 3, 1949. The faded, pointed primaries of the immature plumage contrast with the black, adult-type tail feathers.

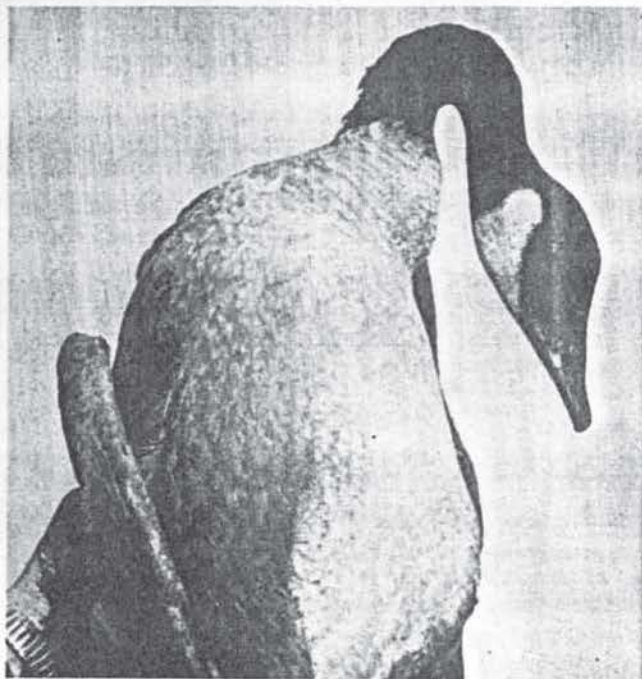


Fig. 5. — A late-hatched immature Canada goose that still retained, in late February, the breast feathers of the juvenile plumage. The prominence of the shaft in each feather gives the breast a streaked appearance.



**Primary Feathers.**—When some of the immature geese in a population have a complete set of adult-type tail feathers in winter, the outermost primary feathers of the wings fortunately provide the investigator with a reliable guide to age determination. The primaries of the immature are pointed; those of the adult are obtuse or rounded, fig. 3. Cloacal characters in wintering birds provide a nearly infallible guide for distinguishing immature males from adult males; however, the cloacal difference between immature and yearling females is largely limited to the depth of the bursa, which is variable.

The use of the primary feathers of the wing for age determination probably has its greatest potential value in taxonomic studies of museum skins. In making a recent study, in various museums, of the skins of races of Canada geese, the author noted specimens that were labeled as to sex but not age or that were incorrectly aged. In these instances a preliminary age determination was made by inspection of the tail feathers and, if these were of the adult type, a conclusive determination was made by inspection of the tips of the primary feathers. Primaries of geese col-

lected in late spring or early summer prior to the molt are usually badly faded by the sun, particularly those of immatures. Being pointed and badly faded, the tips of the primary feathers of the immatures stand out in sharp contrast to the fresh, black tail feathers, fig. 4, which usually are not attained in full complement until at least midwinter, several months after tail feathers of adults have completed growth.

**Breast and Belly Feathers.**—Taverner (1931:31) and Elder (1946:101) have pointed out that breast and belly, or contour, feathers can serve to differentiate immatures from older geese. Breast feathers in the juvenile and postjuvenile plumages of immatures are narrower than in subsequent plumages. They are readily recognized by the prominence of the shaft in each feather, which gives the breast a streaked appearance, fig. 5. Usually these feathers are replaced during the first winter of life by broader contour feathers, which give the underparts a smoother appearance and a more even coloration. Geese in their second winter of life, and older geese, have wider—and somewhat stiffer—breast feathers. Although differences in shape, coloration, and texture of breast

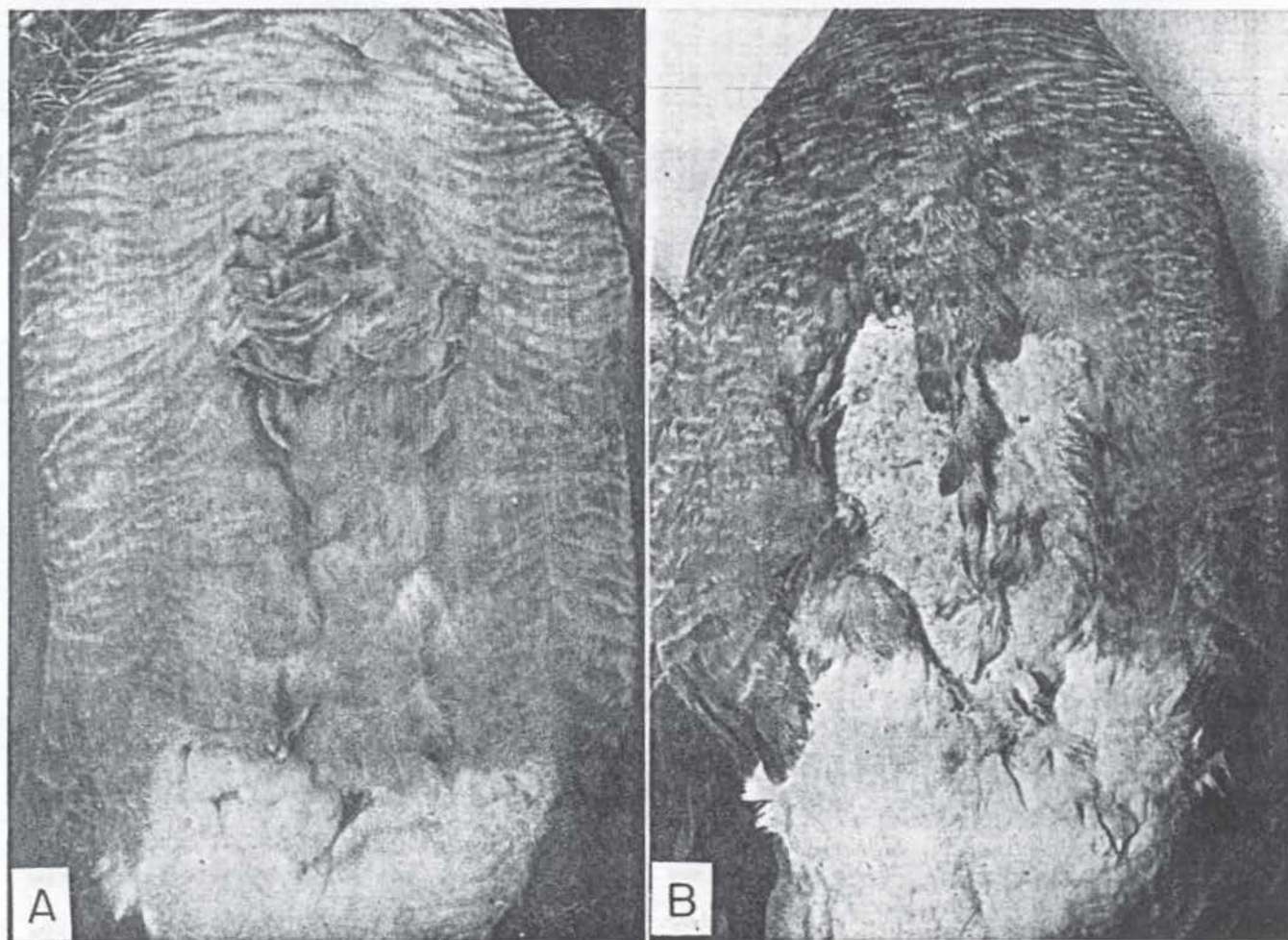


Fig. 6.—Incubation patches of adult female Canada geese during early stages of incubation: A, a 2-year-old with a clutch of three eggs, June 3; B, an old adult with a clutch of seven eggs, May 28.



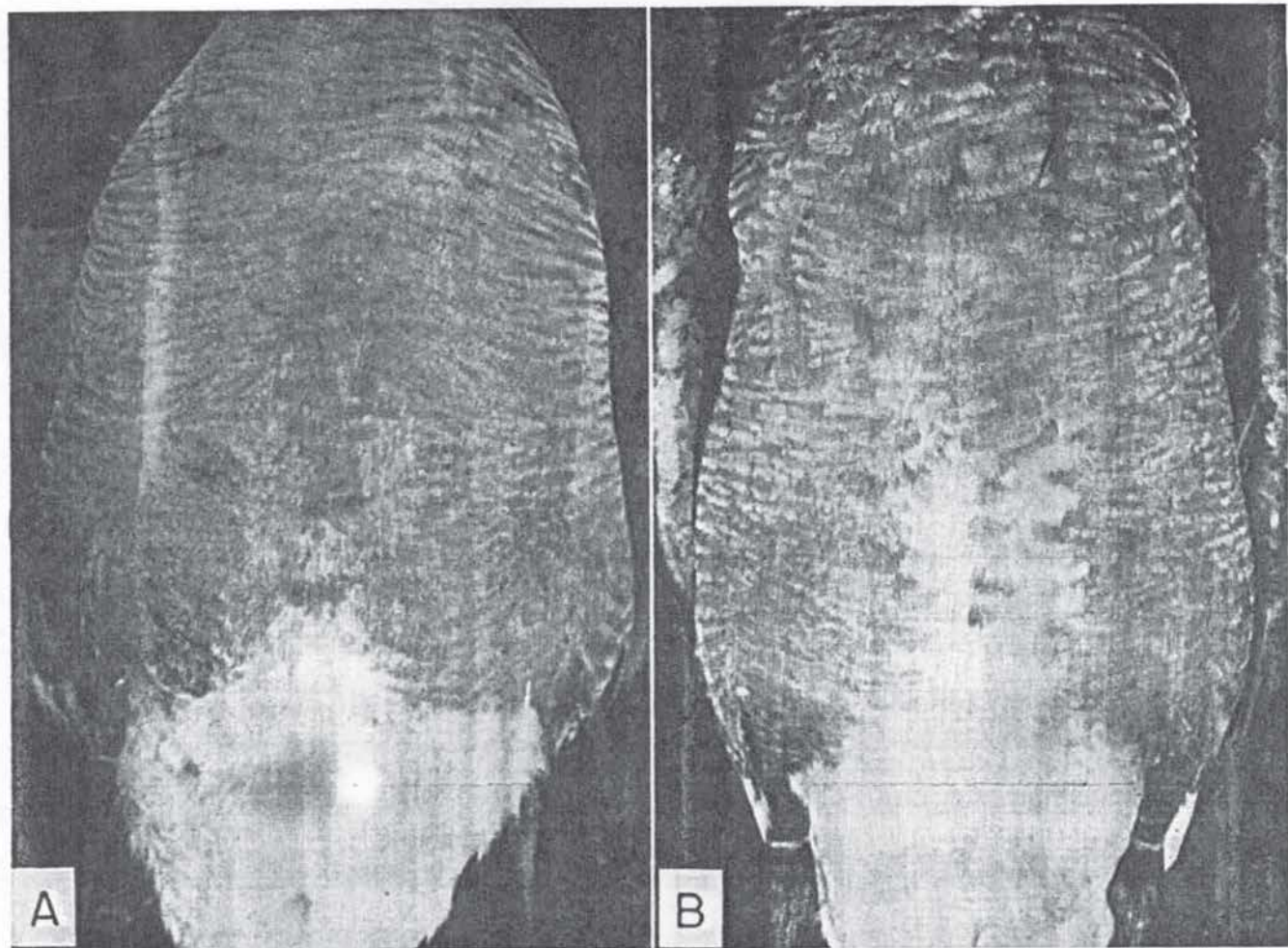


Fig. 7. — Adult female Canada geese in winter with, A, partially pigmented and, B, unpigmented contour feathers on sites of former incubation patches.

feathers might possibly prove useful in aging geese if no other characters were available, the time required for accurate age determination from these feathers does not make their use an efficient technique.

In late spring and the early part of summer, a sexually mature female that has produced eggs can be distinguished from a sexually immature yearling and from a nonproductive, older adult female by the presence, on the lower breast and belly, of a bare or partially bare area known as an incubation patch, fig. 6. This area, from which the female has pulled feathers during the incubation period, is subsequently refeathered. By the onset of the wing molt, or shortly thereafter, when the incubation patch has become refeathered, the fresh, unfaded, and unworn feathers stand out in sharp contrast to the worn and faded feathers of the rest of the breast and belly. The patch feathers, therefore, serve to identify a productive female throughout the flightless period in summer. After this period, the remaining old feathers of the underparts of the body are replaced by new feathers, and the feathers of the patch area may become indistinguishable from the rest of the underparts. In a

small percentage of females, the patch area produces some white or atypically colored feathers, fig. 7. These feathers are retained until the next spring and hence, during the winter period, indicate the site of the previous incubation patch (Hanson 1959:145).

#### THE WING SPUR

The extensor portion of the carpometacarpus bone of the wing can be used in aging geese. In the immatures and yearlings of both sexes in the wintering populations, the skin at this portion of the wing remains feathered, fig. 8A. In adult females, the tip may be partially bare as a consequence of earlier nesting activities. In sexually mature adult males, the tip of the extensor portion of the carpometacarpus is enlarged and sometimes notably knobby, and the skin over it is usually partially denuded of feathers, fig. 8B. This condition is a behavioral or anatomical artifact, the result of repeated injury in fights with other adult males. The development of a clublike tip to the extensor serves to increase the effectiveness of the wing as a weapon of defense.



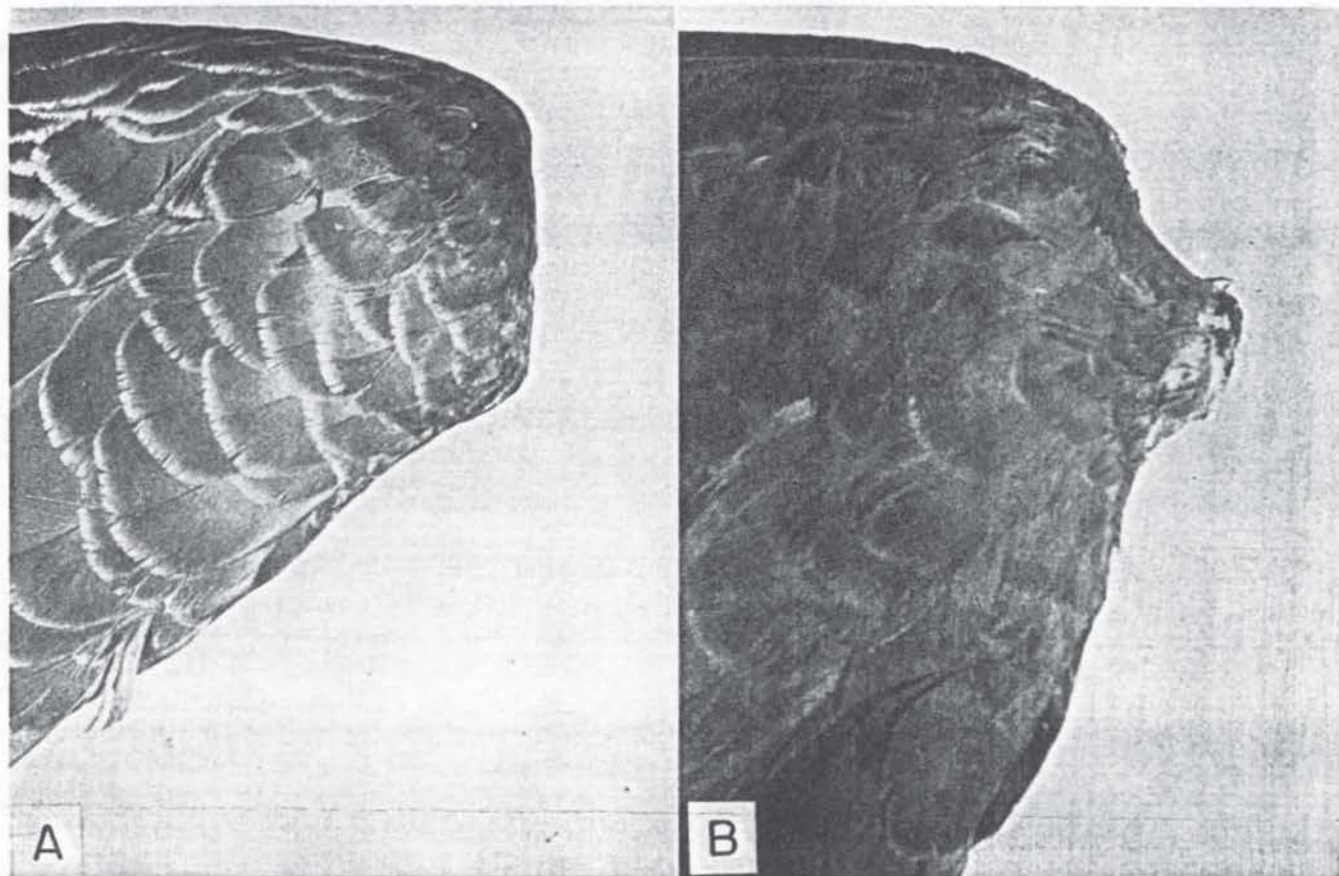


Fig. 8.—Wing of yearling male Canada goose, A, and of an adult male, B. The enlarged, knoblike portion of the car-pometacarpus of the adult is conspicuous.

### THE CLOACA

Within the past quarter century, characters of the cloaca have become widely recognized as criteria of sex and age in waterfowl (Gower 1939; Hochbaum 1942; Elder 1946; Hanson 1949). A Canada goose can be most easily subdued for examination of the age and sex characters of the cloaca if the goose is held upside down on the operator's lap and the breast of the bird is firmly tucked under the operator's chest. The goose can be readily placed in this position if the operator grasps the bird across the humeri with one hand so that the front of the bird is toward the operator. The bird is in position to be placed on the operator's lap with a half-turn of his hand. If the bird is first held so that it faces away from the operator, it must be turned end over end to be in position for examination. It is awkward to handle a goose in this manner, and the abrupt change in position causes the bird to increase its struggles. The struggles of a bird being held can be greatly minimized if its head and neck are tucked under one wing.

Internal examination of the cloaca with the aid of a nasal speculum, fig. 9, is relatively simple provided the goose is securely held. A metal rod about 2 mm. in diameter and with a smoothly rounded tip should

be used as a probe. Extending the cloaca greatly facilitates probing for the bursa. The oviduct attaches to the left wall of the cloaca about 15 mm. below the sphincter muscle. To explore the cloaca for an opening to the oviduct, the operator should hold the speculum at right angles to the axis of the bird's body. The site of attachment of the oviduct is most easily inspected if the probe is held nearly parallel to the left wall of the cloaca and moderate lateral pressure is used to stretch and smooth out the tissue in that area. A speculum can be used with no harm to the bird if the cloaca is spread open rapidly and firmly. Repeated, gingerly made attempts, in addition to causing the bird to struggle, are apt to rupture small blood vessels.

**The Sphincter Muscle.**—The size, conformation, and color of the external bare area of the sphincter muscle, fig. 10, provide some immediate clues to the age and sex of the bird being handled. In immatures of both sexes, the sphincter muscle is flat, small in diameter, and pink-red in color. In yearlings, in winter, the bare area is somewhat larger and may be slightly darker in color. In older, sexually mature geese, the sphincter muscle is usually a darker red or varying hues of purple. Adult males can usually be distinguished from adult females by the marked convexity of the muscle in the males. In adult females, the bare



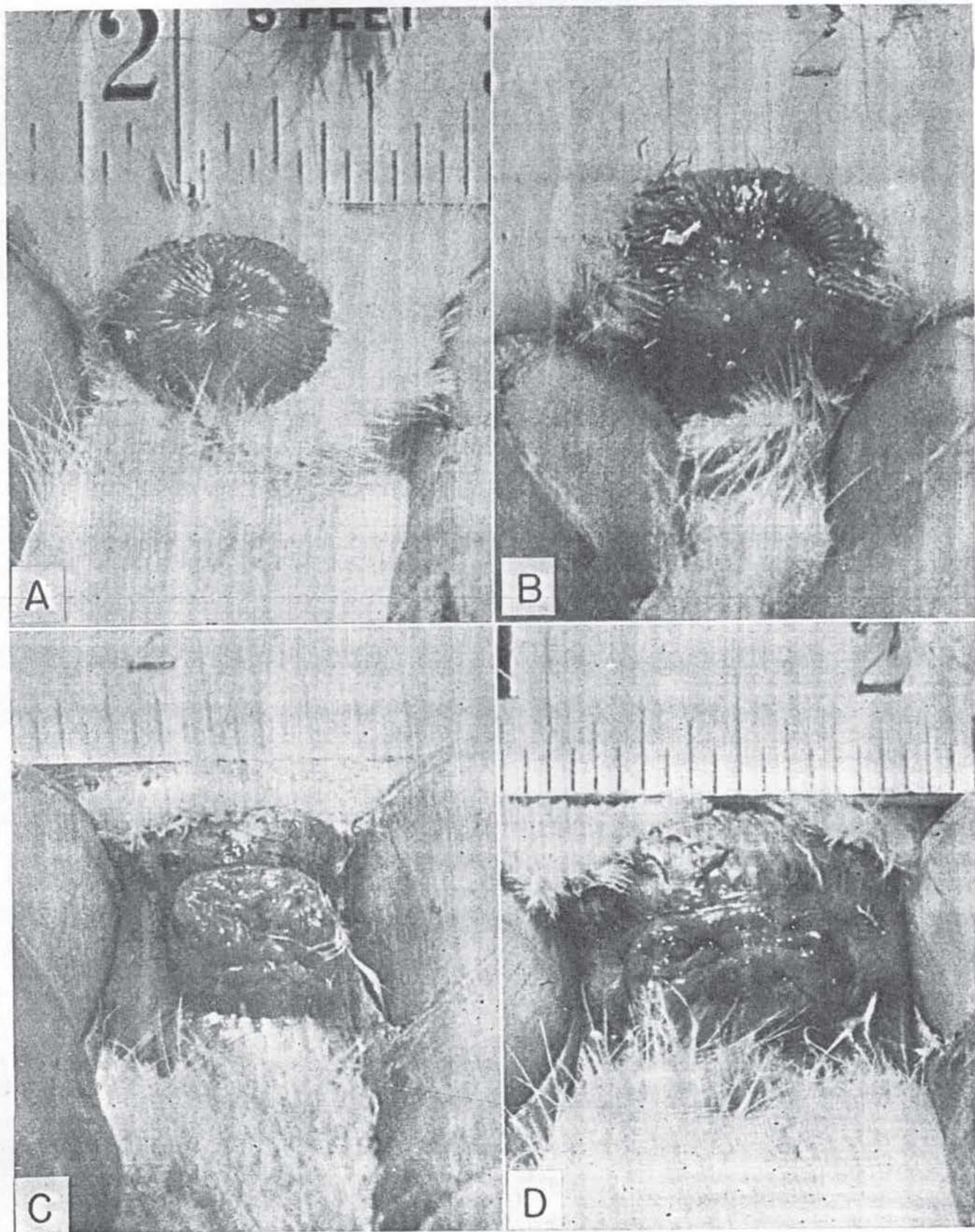


Fig. 10. — Anal sphincter muscles of female Canada geese in winter: A and C, immature; B and D, adult; A and B, the muscle in repose; C and D, the muscle partially everted.



area of the muscle is particularly large and flat in cross section, fig. 10B and D, and the extent to which it can be readily everted usually distinguishes females of this age class from yearling females, fig. 10A and C.

**The Bursa of Fabricius.**—Use of the bursa of Fabricius to distinguish immature from older waterfowl has been described, with reference to ducks, by Gower (1939:427) and by Hochbaum (1942:304-6) and, to Canada geese, by Elder (1946:106-8). Because Canada geese require a longer period to become sexually mature than do most common species of ducks, the bursa of Fabricius is a useful age criterion for distinguishing yearling geese, in winter, from sexually mature adults (Hanson 1949:179-80).

The depth of the bursa in immatures ranges between 24 and 35 mm. The average is about 27 mm. In yearlings, it varies between 15 and 24 mm. and averages about 17 mm. The bursa is either closed or has been resorbed in approximately 58 per cent of geese in their third winter of life; the remainder may have a remnant of the bursa large enough to be

probed, usually to a depth of only 5-10 mm. As a criterion of age in Canada geese, the bursa is of value chiefly in separating yearling from older geese, but it must be used in combination with other cloacal characters. Absence of the bursa can be considered quite certain evidence that a goose is 2½ or more years of age.

Closure of the bursal opening into the proctodeum of the cloaca apparently proceeds most rapidly during the second year of life, that is, in the age group achieving sexual maturity in the third spring of life. A female, fig. 6A, shot along the Sutton River, Ontario, near the coast of Hudson Bay in early June and judged to be nesting for the first time, had a clutch of three eggs, a very restricted incubation patch, and a bursa that had membranous walls that could be probed only with difficulty. She was judged to be nearly 2 years of age.

**The Oviduct.**—In female Canada geese, the membrane that occludes the opening of the oviduct into the cloaca is usually not resorbed until after the geese

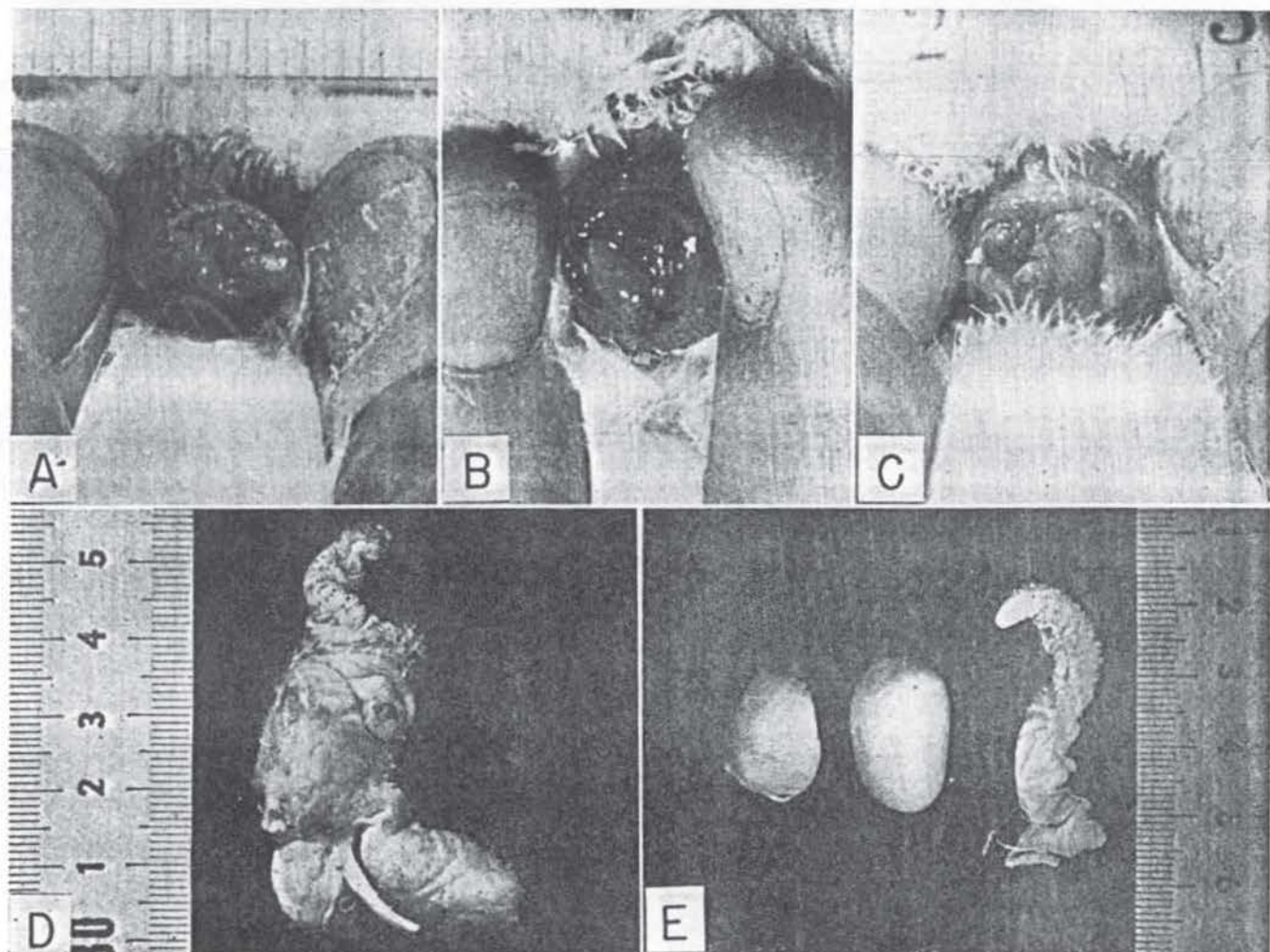


Fig. 11.—Penis of, A, an immature Canada goose during the first winter of life; B, a yearling during its second winter of life; and, C, an older adult in winter. The stage of development the penis a yearling, D, attains during its second spring of life (an immature the previous winter) is nearly comparable to that attained by an adult, E, in spring.



have left their wintering grounds in their third spring of life. Therefore, determining the presence or absence of an occluding membrane at the juncture of the oviduct with the cloaca is the best way, in winter, to distinguish females approximately  $1\frac{1}{2}$  years old from older females. Accurate age determination is of singular importance if the success of the past breeding season is to be estimated from age and sex ratios obtained from trapped birds prior to the hunting season. Studies conducted in preparation for an earlier report (Hanson 1949:181-2), based on banded birds of known age, indicated there was a high degree of accuracy in differentiating females  $1\frac{1}{2}$  years of age from those

older. In approximately 97 per cent of the cases, a female goose that, in fall or winter, has adult-type tail feathers, adult-type primary feathers, and a closed oviduct is approximately  $1\frac{1}{2}$  years old; if she has an open oviduct, she is about  $2\frac{1}{2}$  years of age or older. (In a few individuals, the oviduct may open in the second spring of life.)

**The Penis.**—For most species of geese—and especially for the immatures—determining the presence or absence of a penis is essential to accurate sexing. Eversion of the penis from the cloaca of a male bird is a simple matter in ducks; in geese, because of the larger size and greater strength of the sphincter mus-

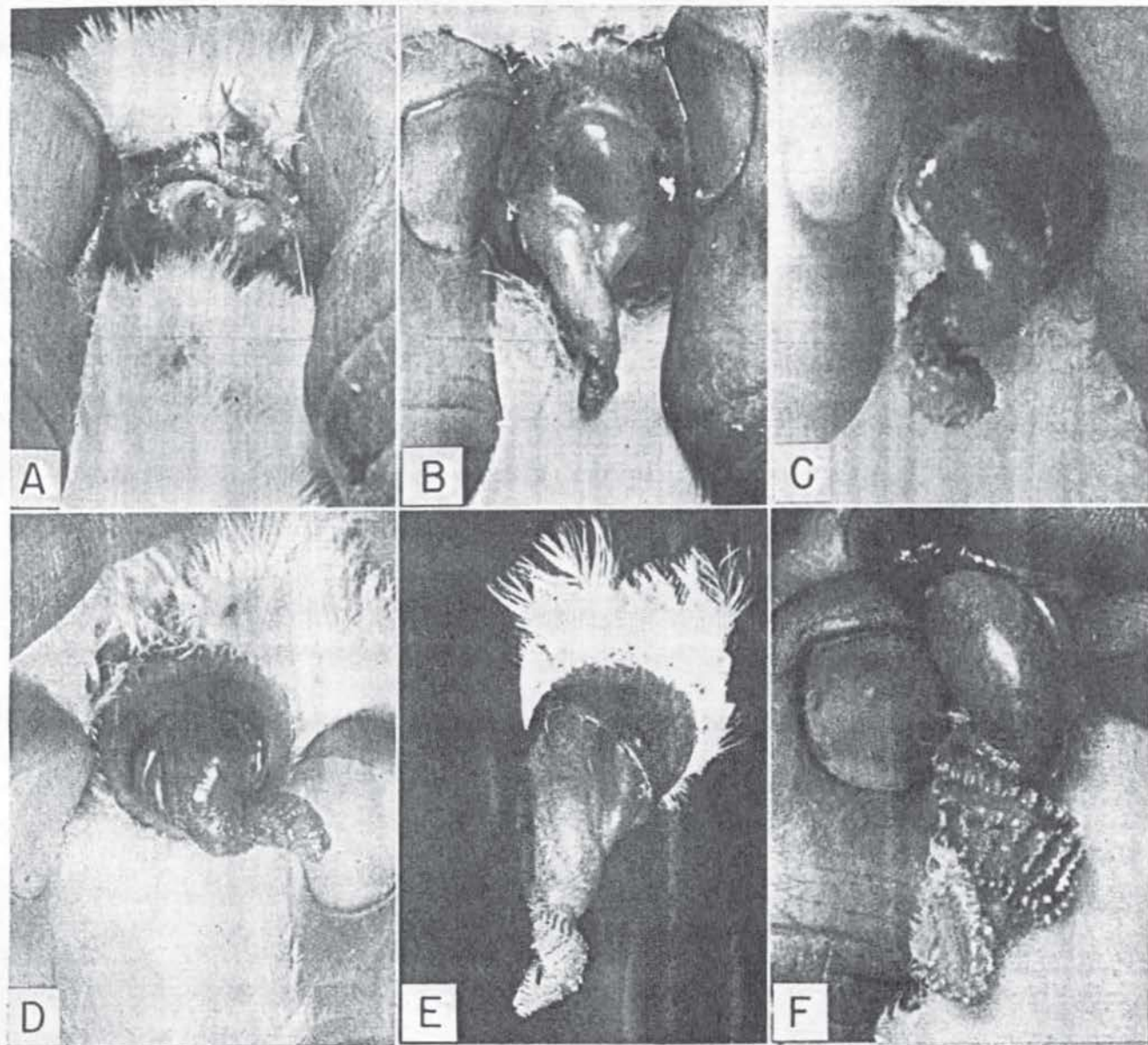


Fig. 12.—Stages of development of the penis of Canada geese as shown by an experiment involving use of light and hormone: A, adult male, untreated in early February; B, yearling male, March 2, after receiving 16 hours of light a day for 18 days; C, captive yearling male, April 11, caged outdoors; D, yearling male that received daily, for 4 days, 16 hours of light and gonadotropic hormone; E, stage intermediate between D and F; F, yearling male, March 2, after being given 16 hours of light and gonadotropic hormone injections daily for 18 days.



cle, eversion is more difficult. The technique is the same in both cases—application of a firm downward and outward rolling pressure of the thumbs when placed on either side of the sphincter muscle. At the same time an upward pressure is applied from below the bird by a lateral surface of the forefinger of each hand. Experience in sexing geese and in examining the cloaca with the speculum is probably best gained, at first, by working with dead birds.

The presence of an immature penis in a wild goose being examined immediately identifies the bird as an immature male. (Captive geese sometimes develop more slowly than wild geese, and some captive yearling males may have immature penes.) The everted penis of an immature will be seen as a small, corkscrew-shaped organ (about the size of the exposed lead tip of a sharpened pencil) situated in the 8 o'clock position, fig. 11A.

Present in female geese is a small papilla on the internal edge of the sphincter muscle. This papilla, situated in the 6 o'clock position, is minute in immatures but somewhat larger in older females. It is believed to be homologous to the clitoris in mammals.

The penis of the yearling male goose in winter, fig. 11B, can be described as intermediate in size between that of an immature and an adult, fig. 11A and C. In the great majority of instances, penis characters, when considered together with the bursa, are useful in distinguishing yearling adults from older adults. The penis in yearlings is about 4 mm. in diameter and 10 mm. long. Its most salient features, a pale, translucent color and a smooth surface appearance, fig. 11B, tend to give it a rather turgid aspect.

The sheathed and unextended penis in older geese, in winter, is generally one and one-half to two times as large as this organ in typical yearlings. It is usually a darker red than the penis in yearlings and is sometimes tinged with purple, particularly toward the distal end. The surface of the sheath is wrinkled in appearance, and the subcutaneous venation is more prominent than that of yearlings.

No discernible change in the development of the penis is seen in wintering immatures prior to northward migration in late February and early March, but in yearlings and adults some enlargement and a tendency to become unsheathed may be noted. By the time Canada geese arrive on the breeding grounds in late April and early May, the penes in all age classes have undergone notable development, fig. 11D and E, particularly the penis of the immature. In the 2-month interval between departure from the wintering grounds and arrival on the breeding grounds, the penis of the immature, fig. 11D, undergoes development nearly comparable to that of the adult in spring, fig. 11E. However, the immature still possesses a large bursa, fig. 10D, and in most cases immature tail feathers, which provide incontestable evidence that the bird is, indeed, only a 1-year-old.

The maturation of the penis can be observed in a series of photographs, fig. 12, taken in the course of an experiment on the effects of increased light and of daily injections of gonadotropic hormones on the maturation process.

## DISCUSSION AND SUMMARY

In addition to the principal characters of age and sex discussed above, there are general clues to the age and sex of the bird being handled. For example, birds in the various age and sex classes vary considerably in size. In winter, the weight of an immature *Branta canadensis interior* averages about 1½ pounds less than that of the adult; the weight of a yearling averages one-half pound less. Males are heavier than females by an average of nine-tenths of a pound in the immature and yearling age classes and 1½ pounds in the adult age class. These differentials in weight are reflected in muscular development. With experience, an operator should have a fairly accurate idea of the age and sex of a live goose simply by grasping it by the humeri. The muscles around the humeri of immatures are not fully developed and they feel stringy; those of older geese, particularly adult males, are well developed. The inexperienced can most effectively learn to sex and age geese in fall and winter by using the key below:

1. Some or all tail feathers with notched, worn tips and relatively narrow vanes, fig. 2A, B, D; color blackish brown . . . . . 6
- All tail feathers with unnotched, unworn tips and relatively broad vanes, fig. 2C; color black . . . . . 2
2. Primaries pointed at tips, fig. 3B . . . . . 6
- Primaries obtuse or rounded at tips, fig. 3A . . . . . 3
3. Penis present . . . . . 4
- Penis absent . . . . . 5
4. External portion of sphincter muscle a pale flesh color; penis intermediate in size, fig. 11B, usually a pale flesh color, translucent and smooth; bursa open and easily probed, usually to a depth of 15–20 mm.; spur of each wing smooth and feathered over at tip, fig. 8A . . . . . yearling male
- External portion of sphincter muscle dark red or purple; penis large, figs. 11C and 12A, dark red or purplish in color, with wrinkled surface and fairly prominent venation; bursa closed or, if open, shallow and probed with difficulty; tip of each wing spur enlarged and knobby at tip and more or less denuded of feathers, fig. 8B . . . . . adult male
5. External portion of sphincter muscle, fig. 10A, not much larger than that of immature and light flesh-red in color; oviduct closed at juncture with cloaca; bursa open and easily probed, usually to a depth of 15–20 mm., as in yearling male . . . . . yearling female
- External portion of sphincter muscle, fig. 10B, much larger than that of either immature or yearling female and dark red or blotched with purple; oviduct open and easily probed; bursa closed or, if open, shallow and probed only with difficulty . . . . . adult female
6. Penis present, fig. 11A . . . . . immature male
- Penis absent . . . . . immature female

On the breeding grounds, fig. 13, in spring and summer, the problems of aging geese are more complex and subtle than on the wintering grounds in fall and winter. A male possessing an adult-type tail and



a penis that indicates sexual maturity is, nevertheless, only 1 year of age if tips of the primary feathers are pointed, worn, and faded. A year-old female, prior to the molt in her second summer of life, possesses primaries with pointed tips and, with very few exceptions, a closed oviduct. A year-old goose of either sex still retains a large, easily probed bursa.

A 2-year-old goose, after its return to the breeding grounds for the third summer of life, cannot be iden-

tified with certainty; in individual cases, however, identification based on a combination of characters may be accurate. An incompletely resorbed bursa together with a normal uninjured wing spur indicates a 2-year-old male; an older male lacks a bursa and, in all probability, has a knobby, enlarged wing spur. A female possessing an open oviduct, a remnant of a bursa, and either a very small or no brood patch may be considered 2 years old. An older female, par-



Fig. 13. — Cree Indian guide on the north coast of Akimiski Island in James Bay with flightless Canada goose of the race that winters in Illinois. During the flightless period of the molt, geese on the breeding grounds can be herded into funnel traps and caught, after which they are aged, sexed, banded, and released.

ticularly one in the process of egg-laying, has a flaccid, easily distended sphincter muscle, an enlarged oviduct opening, and a prominent brood patch. In a female of either age class, the presence or absence of a brood patch in midsummer should indicate whether or not the individual had attempted nesting in the current season.

The question has often been posed as to what per cent of the 2-year-old females nest in their third spring of life. To determine the answer for a large and widely scattered population would be difficult and expensive. It would be necessary to collect a statistically significant number of females early in the nesting cycle, determine the percentage of 2-year-old females (aged by bursa examination), and then relate the data obtained to the percentage of yearlings identified in the population the previous winter. At the present time, or until more definitive characters of age in breeding geese are found, a program that attempted estimates of this nature for large and widely scattered populations as its chief objective would have dubious merit. On the other hand, a program dealing with a non-migratory wild population of limited size—a population that could be aged, banded, and subsequently closely observed—would provide information on the percentage of females that nest at 2 years of age. However, the statistics obtained from such a population might not apply to other populations.

At the present stage of our knowledge, predictions of populations must be based on the assumption that all females attempt to nest at approximately 2 years of age or in their third spring of life. Estimates of

fall populations must be based on the average productivity of all females 2 or more years of age.

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UNITED STATES DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service

IROQUOIS NATIONAL WILDLIFE REFUGE  
PO Box 517 - Casey Road  
Alabama, NY 14003

"TAKE PRIDE IN AMERICA"

November 20, 1989

Mr. Bryan Swift  
NYSDEC - Game Bird Unit  
Wildlife Resources Center  
Delmar, NY 12054

1/9

Dear Bryan:

Enclosed are the 1989 Canada Goose morphological measurement forms from the regulated hunt at Iroquois NWR. Harvest for the season totalled 166 geese of which 154 were submitted to the check station. The remaining 12 were either gutted in the field or were missed by check station personnel. Age and sex-specific totals were as follows: 41 AHY M, 46 AHY F, 24 HY M, 23 HY F and 20 HY U. I apologize for not sexing the HY geese during the first two hunt days. Our waterfowl season on the refuge ended with the close of the duck season on November 11, 1989. Weekly surveys have consistently shown fewer geese present on the refuge this year than in recent years, although this year's harvest was a little higher than last year.

Migration peaks have been difficult to follow because of the continual redistribution of geese between the State Wildlife Management Areas and the refuge hunted and nonhunted areas. However, the first red and white neck-collared geese (Canadian banding) were sighted during the first week of November.

Hopefully this information will be of some help. If you have any questions call me at (716)948-5445.

Sincerely,

ERIC

Eric L. Derleth  
Wildlife Biologist

ELD/np



## CANADA GOOSE MORPHOLOGICAL MEASUREMENT DATA FORM

RETURN TO: Bryan Swift  
 NYSDEC-Game Bird Unit  
 Wildlife Resources Center  
 Delmar, NY 12054

BAND #	DATE (MM-DD-YY)	AGE	SEX (M/F)	STATE/ PROV.	TARSUS (MM)	AHY ONLY		LAT-LONG	LOCATION NAME
		(HY/AHY UNK)				CULMEN (MM)	MEASURER		
	10-21-89	AHY	M	N.Y.	106	62	E. Darleth	430-0782	Iroquois
		AHY	F	N.Y.	99	49	"		"
		AHY	M	N.Y.	105	55	"		"
		AHY	M	N.Y.	91	55	"		"
		AHY	M	N.Y.	93	51	"		"
		AHY	F	N.Y.	89	51	Frisque		"
		AHY	M	N.Y.	97	54	Darleth		"
		AHY	F	N.Y.	93	52	Frisque		"
		AHY	M	N.Y.	97	46	Darleth		"
		AHY	F	N.Y.	89	53	Frisque		"
		AHY	F	NY	89	53	Darleth		"
		AHY	F	N.Y.	100	57	Nice		"
		AHY	F	NY	96	56	Darleth		"
		AHY	F	NY	90	54	Frisque		"
		AHY	M	NY	98	57	Frisque		"
		AHY	F	NY	94	51	Darleth		"
		AHY	F	NY	88	51	Frisque		"
		AHY	M	NY	105	61	Darleth		"

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BAND #	DATE (MM-DD-YY)	AGE	SEX (M/F)	STATE/ PROV.	AHY ONLY			LAT-LONG	LOCATION NAME
		(HY/AHY UNK)			TARSUS (MM)	CULMEN (MM)	MEASURER		
	10-21-89	AHY	M	NY	102	57	Derleth	420-0782	Tropuois
		AHY	F	NY	89	50	Frisone		"
		AHY	M	NY	107	63	Derleth		"
		AHY	M	NY	104	56	Frisone		"
		AHY	F	NY	94	56	Derleth		"
		AHY	M	NY	104	61	Frisone		"
		AHY	F	NY	94	56	Derleth		"
		AHY	M	NY	100	54	Frisone		"
718-26079		AHY	M	NY	110	57	Derleth		"
		AHY	F	NY	85	47	Frisone		"
		AHY	F	NY	94	54	"		"
		AHY	F	NY	101	52	Derleth		"
		AHY	M	NY	90	51	Frisone		"
	10-22-89	AHY	F	NY	88	52	Caldwell		"
		AHX	F	NY	93	51	"		"
		AHX	M	NY	93	55	Alice		"
	10-22-89	AHX	F	NY	95	54	"		"
	10-24-89	AHY	M	NY	105	54	DERLETH		"

10/21/89 18 HY GEESE - SEX NOT RECORDED

10/22/89 2 HY GEESE - SEX NOT RECORDED

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					TARSUS (MM)	CULMEN (MM)			
	10-24-89	HY	F	NY			Derleth	430-0782	IROQUOIS NWYR
		AHY	M	NY	97	54	Nice		"
		AHY	M	NY	94	55	Derleth		"
		HY	M	NY			Derleth		"
		HY	M	NY			Derleth		"
		AHY	M	NY	99	54	Derleth		"
		HY	F	"			Nice		"
		HY	M	"			Derleth		"
		AHY	F	"	94	55	"		"
		AHY	M	"	108	58	"		"
	10-26-89	HY	M	"			Nice		"
		AHY	M	"	107	51	Knowlton		"
		AHY	M	"	106	56	Knowlton		"
		AHY	F	"	94	52	Knowlton		"
	<del>10-27</del>	HY	F	"					
	10-21	AHY	F	"	85	48	Derleth	230-0782	"
	10-28-84	AHY	F	"	104	54	Derleth		"
	10-28	AHY	F	"	92	57	"		"

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		(HY/AHY UNK)			TARSUS (MM)	CULMEN (MM)	MEASURER		
	10-28-89	AHY	F	NY	104	Shot off	Darboeth	430-0782	Iroquois
		HY	M						
		HY	M						
		HY	F						
		HY	F						
		AHY	F		96	51	Caldwell		
		AHY	F		94	55	Darboeth		
		HY	M				Darboeth		
		HY	F				Caldwell		
	10-31-89	HY	F				Darboeth		
		AHY	F		86	48	"		
		HY	F				Darboeth		
		HY	M				Friscoe		
		HY	F				Darboeth		
		AHY	F		96	56	Friscoe		
		AHY	F		99	57	Darboeth		
		AHY	F		91	55	Friscoe		
		HY	M				Darboeth		



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		(HY/AHY UNK)			TARSUS (MM)	CULMEN (MM)			
	10-31-89	AHY	F	NY	89	52	Derleth	430-0782	Longuevis
		HY	F				"		
		AHY	M		96	57	Frisque		
		AHY	M		105	60	Derleth		
	11/2/89	AHY	M		102	62	Frisque		
	11/2/89	HY	F				Krownlton		
		HY	M						
		AHY	F		91	52	Frisque		
		AHY	F		92	54	Krownlton		
		AHY	F		91	56	Krownlton		
		AHY	M		103	55	"		
		LY	M				"		
		HY	F				"		
		AHY	M		100	58	"		
		LY	M				Frisque		
		AHY	M		100	55	Krownlton		
		AHY	M		101	61	"		
		AHY	M		95	56	Frisque		

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		(HY/AHY UNK)			TARSUS (MM)	CULMEN (MM)			
	11/2/89	HY	M	NY			Knowlton	430-0782	Loganville
		HY	F				"		
		AHY	F		91	54	Frisque		
		HY	M				Knowlton		
		HY	F				"		
		HY	F				Frisque		
		HY	M				"		
		HY	F				Knowlton		
		HY	F				Frisque		
		HY	M				Knowlton		
		AHY	F		98	56	"		
		AHY	F		91	52	Frisque		
	11/4/89	AHY	M		106	56	Derleth		
		AHY	F		92	53	"		
		AHY	F		98	55	"		
		AHY	F		103	54	"		
		AHY	F		94	54	"		
	11/7/89	AHY	M		105	56	Nice		



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		(HY/AHY UNK)				TARSUS (MM)	CULMEN (MM)			
	11-7-89	AHY	F	NY		94	53	NICE	430-0782	Logans
	"	AHY	M			99	55	I		
	11-9-89	HY	F					Nice		
		HY	M							
		AHY	M			102	58			
		HY	M							
		HY	M							
		HY	F							
		AHY	M			112	60			
		AHY	F			89	51			
		AHY	M			98	56			
		HY	F							
		HY	F							
		AHY	M			103	58			
	11-11-89	HY	M					Frisane		
		HY	M					O"		
		HY	F					Nice		
		HY	M			110	63	"		

