

ARMY MEDICAL MUSEUM



PHOTO-MICROGRAPHS

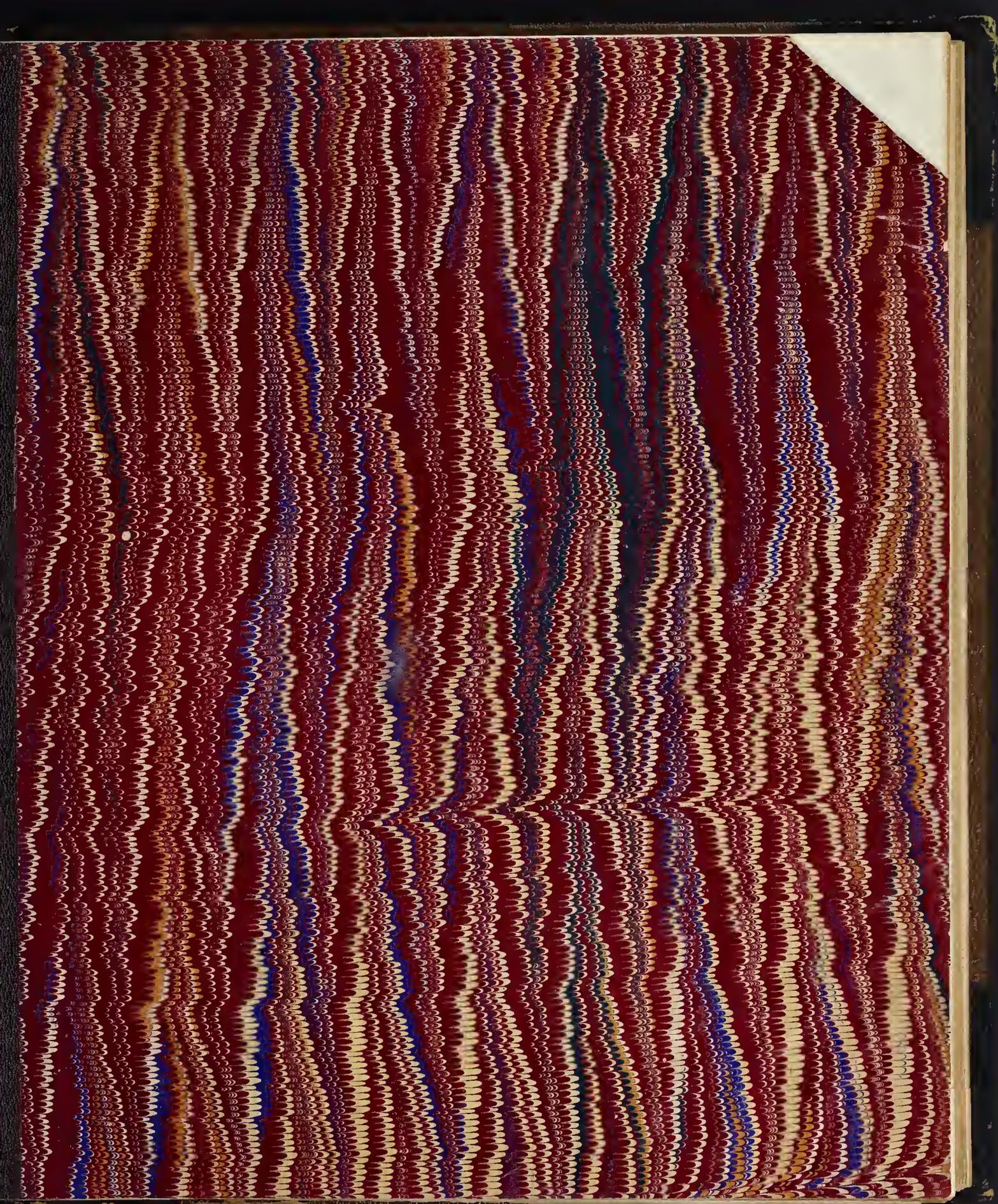
OF THE

MOSQUITO, &C.

BY

D<sup>r</sup>. J. J. WOOLWARD, U. S. A.







*Letter to the Surgeon General of the Army accompanying seven photographs of some of the external appearances of the Mosquito.*

ARMY MEDICAL MUSEUM.

January 5, 1872.

BRIGADIER GENERAL J. K. BARNES,

SURGEON GENERAL, U. S. ARMY.

GENERAL: During the recent Christmas holidays I employed a few mornings in making photographs of the microscopical appearances of certain insect preparations. It was my desire to comply with the wish you had not long before expressed that I would put into your hands a few representations of familiar objects which might serve to illustrate, to intelligent persons unacquainted with the technical details of histological research, the powers of the microscope and the possibility of fair photographic illustrations of microscopical subjects.

The series of negatives produced represent: 1. The external appearance of the Mosquito. 2. Certain Parasites. 3. The Proboscides of various Flies. 4. Some miscellaneous views of insects and parts of insects.

In submitting these pictures for your favorable consideration, I beg you to understand that I do not offer them as scientific studies of the objects represented. The microscopical work conducted under my supervision at the Museum is necessarily confined to the investigation of disease, and so much of normal histology as is indispensable to the right comprehension of morbid processes. The present effort is therefore quite out of my usual line of work and the result must be judged with a full understanding of that fact. To make a sincere scientific investigation of the anatomy of the Mosquito alone, to prepare the necessary specimens and to reproduce them photographically, would be at least an undisturbed year's hard work for the most zealous microscopist. Such an investigator, had he fortunately the time and means at his disposal, would so modify his specimens by the use of proper bleaching and other reagents, as to render it possible to photograph the least detail in the most satisfactory manner; whereas I, compelled from the circumstances of the case to make use of such ready made specimens as I could procure in the market at a nominal cost, could only hope in the brief time at my disposal to indicate what might have been done in the same direction under more favorable circumstances.

With these preliminary remarks I proceed to a brief description of the series representing the external appearances of the Mosquito.

These photographs represent views of different portions of a male Mosquito prepared by Mr. W. H. Walmsley of Philadelphia, Pa.

The Mosquito of the United States is closely allied to the Gnat of Europe which has been so often the subject of microscopical writers.

The first photograph (Negative No. 493, new series) gives a view of the whole insect magnified eleven diameters by Beck's 4 inch objective. Even with this low power the plumose antennae, the complex stinging and sucking apparatus, the six legs, the abdominal segments, and the terminal hooks of the tail are plainly indicated. The plumose antennae and the hooks of the tail are peculiar to the male insect, the same parts being quite different in the female.

The second photograph (Negative No. 495, new series) represents the head of the Mosquito magnified 90 diameters by Beck's 2-3rds. A portion of the hexagonal facets of the compound eyes are indicated, and portions of the branching antennae and other appendages of the head with their hairs and scales are shown.

hexagonal facets. In a flattened preparation, such as the one here represented, the compound eyes are, of course, very much distorted, yet a general notion of the character of these organs may be obtained by an examination of this picture.

The fifth photograph (Negative No. 496, new series) represents the tail of the insect with the terminal hooks which serve to grasp the female; magnified 90 diameters by Beck's 2-3rds.

The sixth photograph (Negative No. 500, new series) represents a portion of one of the abdominal segments of the insect, with some of the peculiar scales in situ; magnified 135 diameters by Beck's 4-10ths. Most of the scales have been accidentally brushed off in making the preparation. The body, legs, feelers, and suckers as well as the edges and ribs of the wings of the Mosquito are provided with these scales, which vary somewhat in form on different portions of the creature, but have every where the same general structure.

The seventh photograph (Negative No. 501, new series) represents a scale from one of the abdominal segments magnified 1400 diameters by Powell and Lealand's immersion 1-16th. The scale is characterized by distinct beaded ribs, terminating in projecting bars; between these ribs are well marked cross lines probably the expression of corrugations in the double membrane, which composes the scales.

The several parts of the Mosquito are so similar to those of the Gnat, that the various works on this latter insect may be consulted with interest by those who wish to understand the structure of the Mosquito.

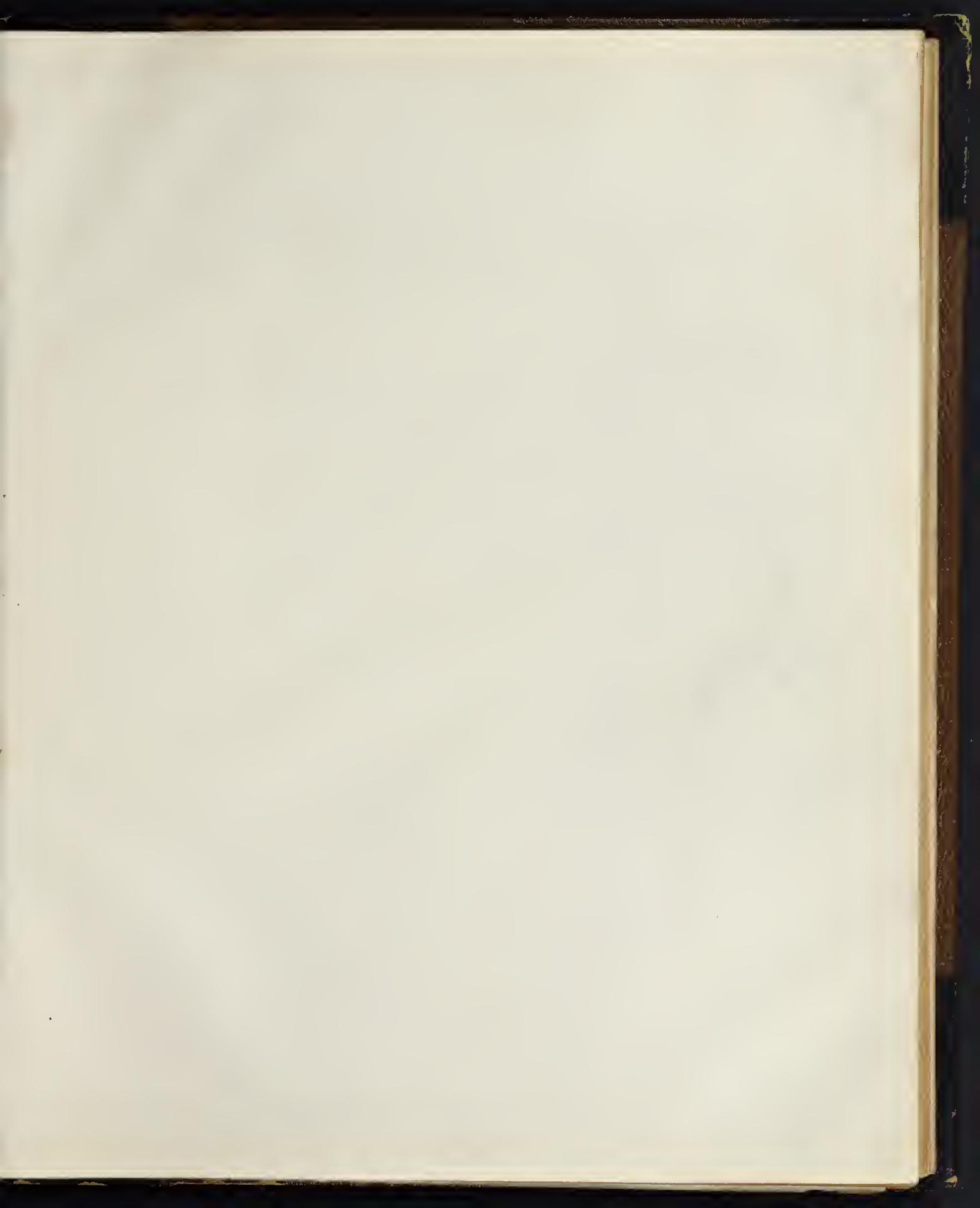
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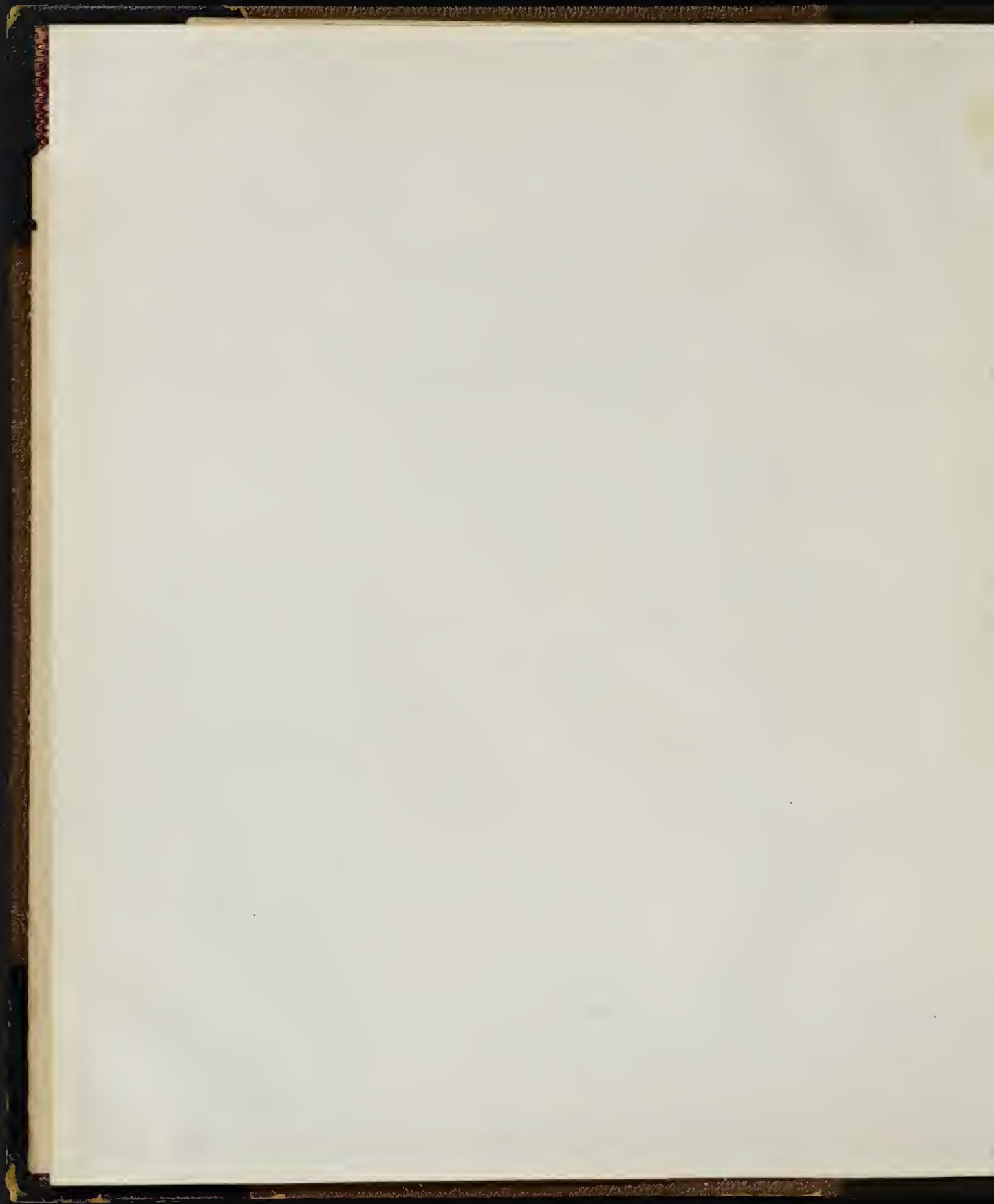
Very respectfully,

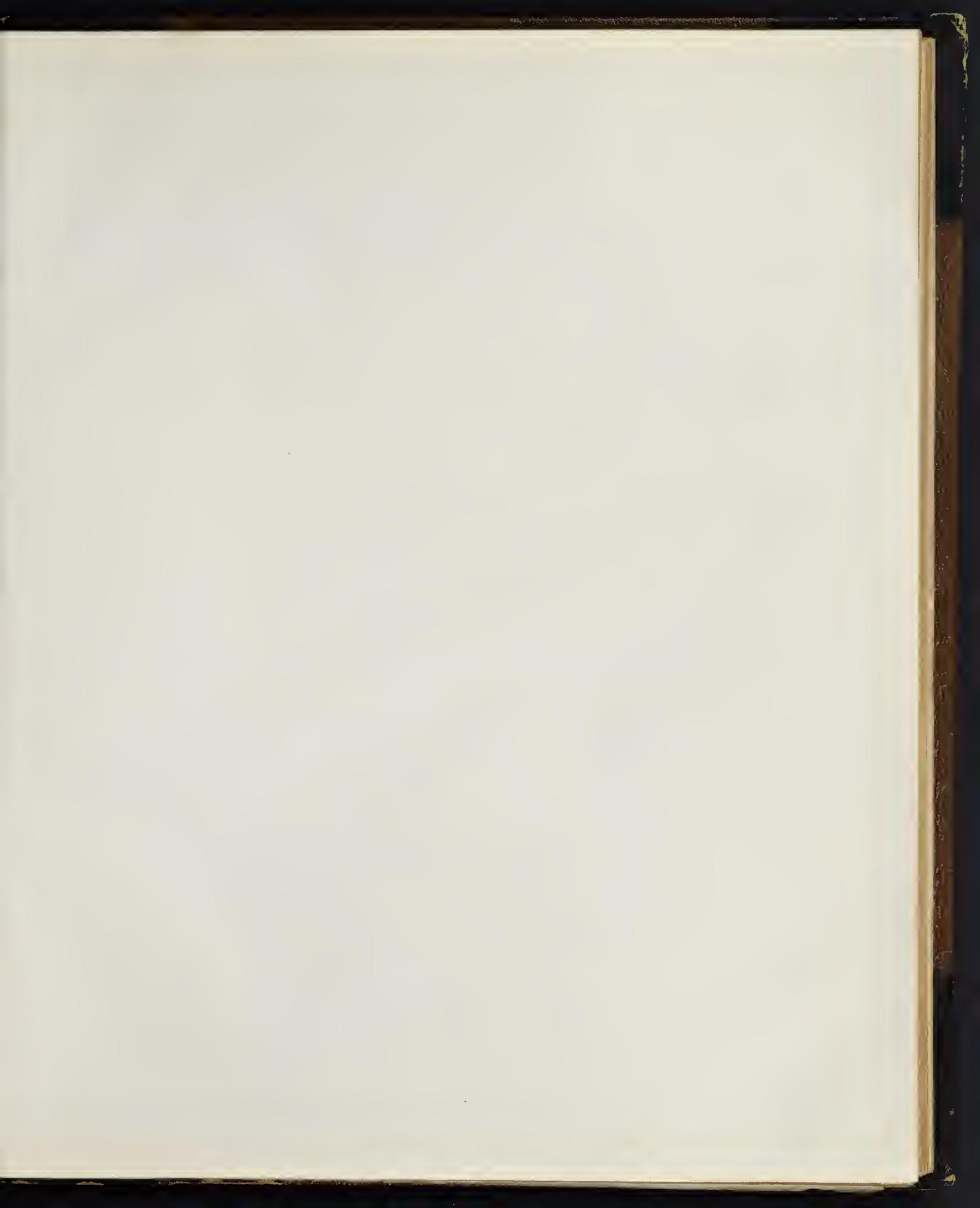
Your obedient servant,

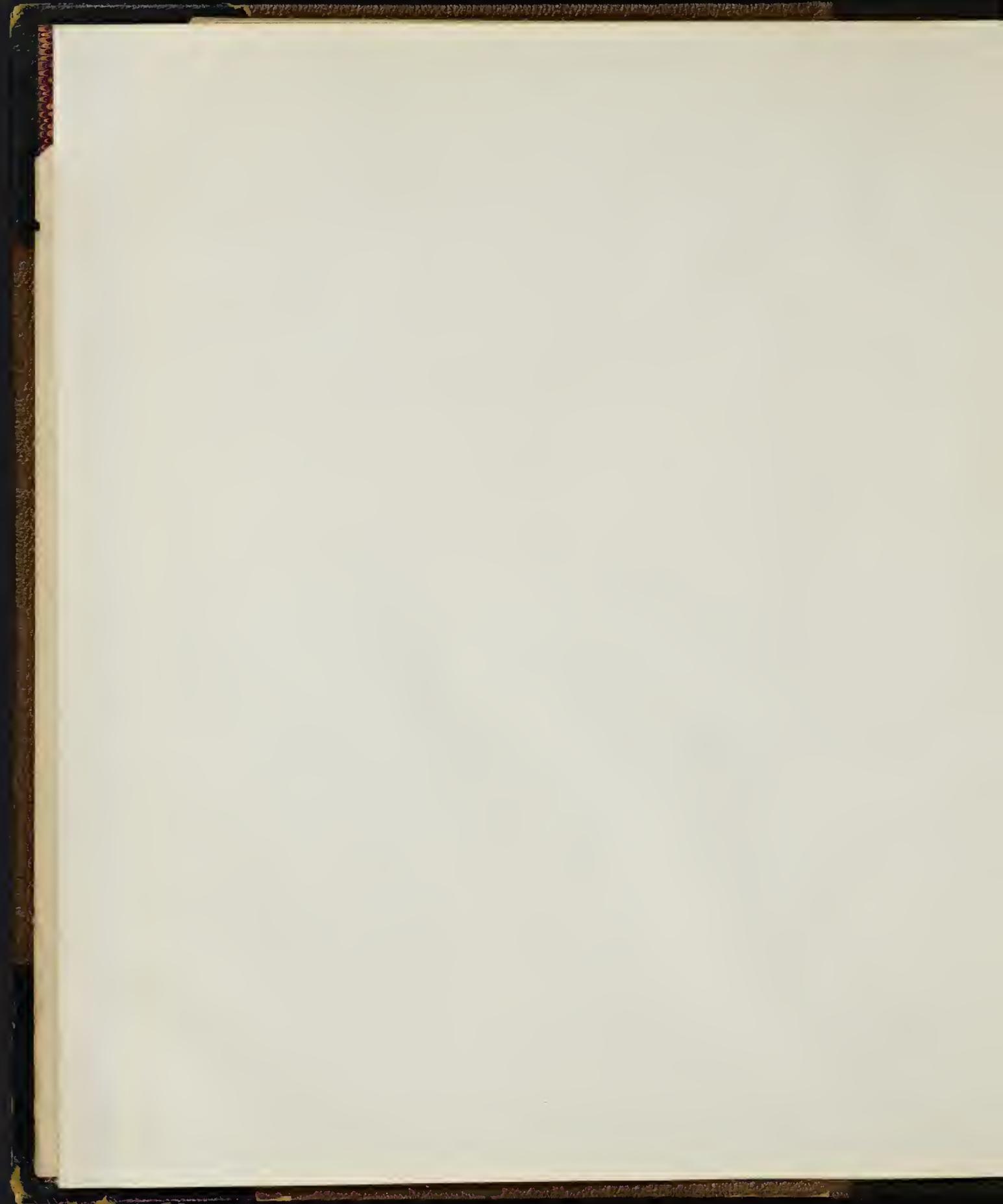
J. J. WOODWARD,

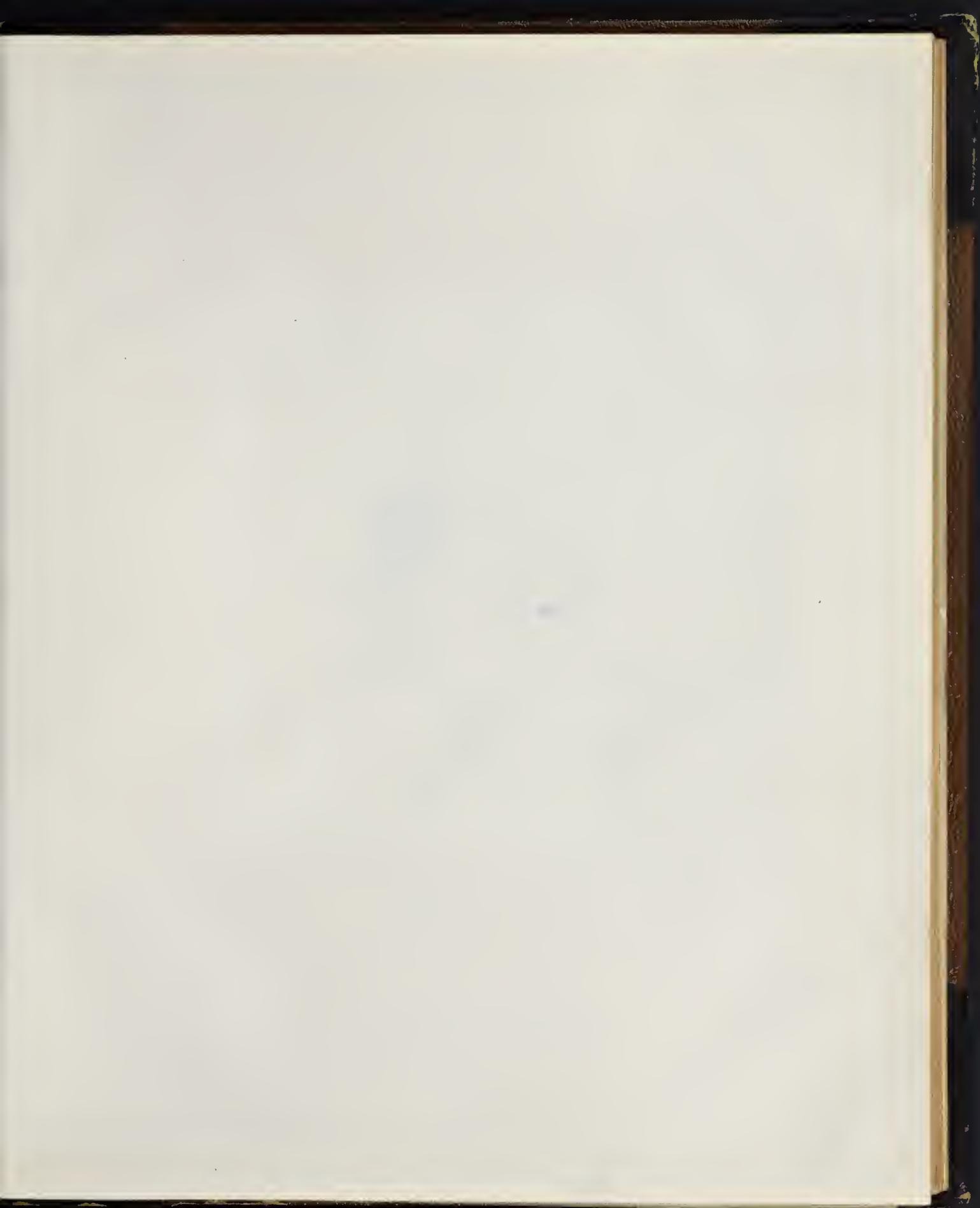
*Assistant Surgeon, U. S. Army.*

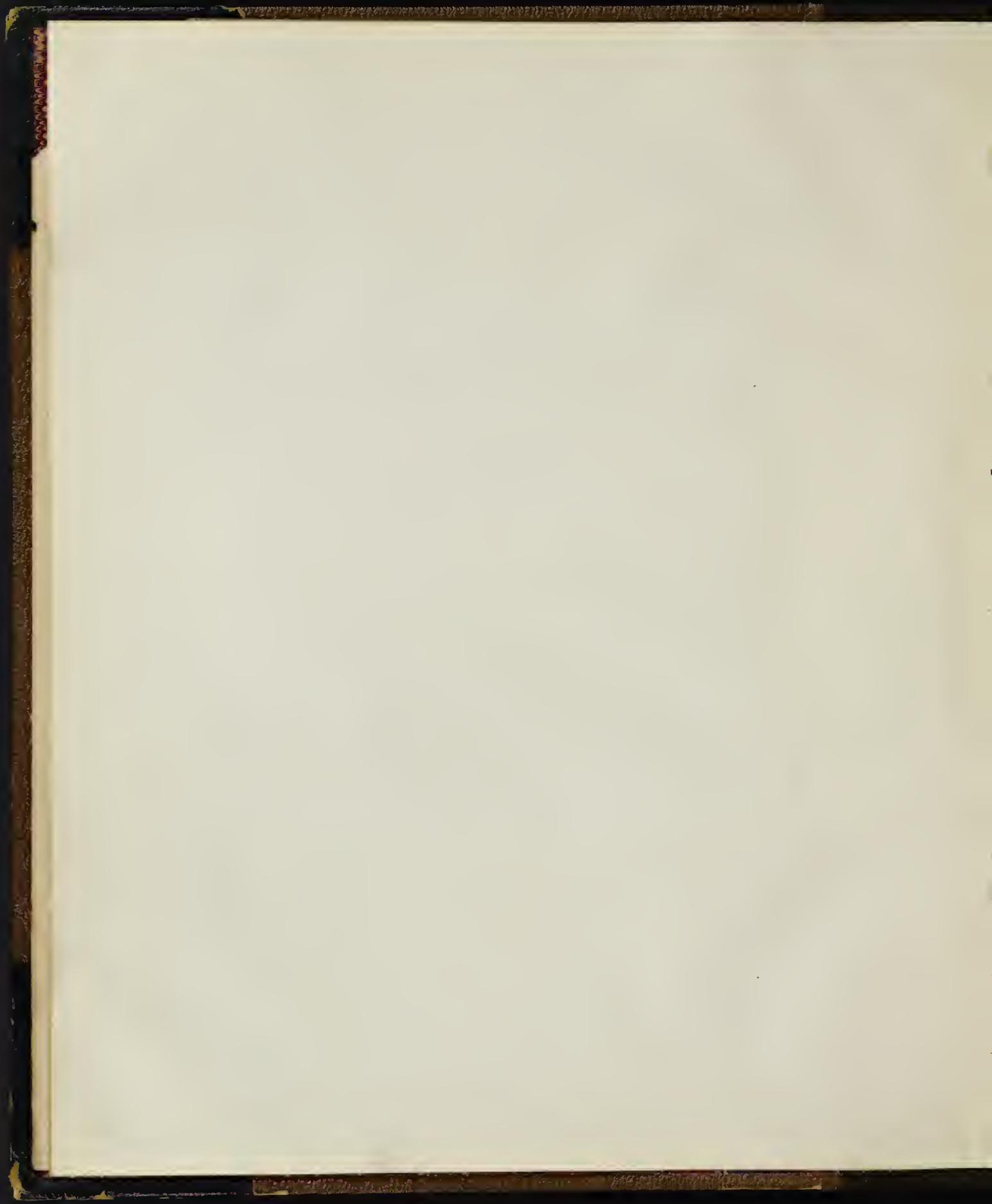














**WAR DEPARTMENT.**  
*Surgeon General's Office, Army Medical Museum.*

*Mosquito*

Magnified *11* diameters by *Reeks 4 in.*  
Photo Micrographic Negative No. *493* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT.  
Surgeon General's Office, Army Medical Museum.

*Heads of Mosquito*

Magnified 90 diameters by ... *Reed's 2/3<sup>rd</sup>*  
Photo Micrographic Negative No. *495* ... New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





**WAR DEPARTMENT.**

*Surgeon General's Office, Army Medical Museum.*

*Stinging Apparatus of Mosquito*

Magnified *10* diameters by *R. C. R. 1/15*

Photo-micrographic Negative No. *494* New Series

By J. J. WOODWARD, Asst. Surg., U. S. A.

BY ORDER OF THE SURGEON GENERAL





**WAR DEPARTMENT.**  
*Surgeon General's Office, Army Medical Museum.*

*Heads of Mosquito*

Magnified *125* diameters by *Reck 4/10/16*  
Photo-Micrographic Negative No. *498* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Tail of Mosquito*

Magnified...44...diameters by...*Reek's 2/12/05*  
Photo-Micrographic Negative No...*716*... New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Abdominal segment of Mosquito with scales.*

Magnified <sup>135</sup> diameters by *Beek's 4/10 67*  
Photo-Micrographic Negative No. *101* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





**WAR DEPARTMENT,**  
*Surgeon General's Office, Army Medical Museum.*

*Scale of Mosquito*

Magnified *400* diameters by *Coyell & Sealands* in *1895*

Photo-Micrographic Negative No. *111* New Series

By J. J. WOODWARD, Asst. Surg., U. S. A.

By ORDER OF THE SURGEON GENERAL







*Letter to the Surgeon General of the Army accompanying ten photographs of certain parasites.*

ARMY MEDICAL MUSEUM,

January 10, 1872.

BRIGADIER GENERAL J. K. BARNES,

SURGEON GENERAL, U. S. ARMY.

GENERAL: In my letter accompanying certain photographs of the Mosquito, I explained the circumstances under which these representations of subjects so foreign to my ordinary line of work, were produced. On the present occasion, therefore, I confine myself to a brief description of the photographs herewith transmitted.

No. 1. Bed-bug (*Cimex lectularius*) magnified 30 diameters. Negative No. 455, new series. This is a hemipterous insect, in which, however, the wings are wanting. The photograph exhibits the numerous bristles or hairs with which all portions of the creature are beset; the six legs with their terminal hooks; the small, somewhat quadrate head, deeply sunk in the prothorax; on each side of the head the four-jointed antennae or feelers, (the last joint of the left antenna is broken off); and finally between the antennae the jointed beak with which the bug makes its attack upon our flesh.

No. 2. Head-louse (*Pediculus capitis*) magnified 50 diameters. Negative No. 452, new series. The louse, like the bed-bug, is a wingless hemipterous insect. The specimen photographed is a male. The picture shows the integument of the insect to be every where beset with short delicate bristles. Each of the six legs terminates in a conspicuous claw, admirably formed for grasping the hairs among which it lives. The head bears two five-jointed antennae between which the mouth-parts terminate in a beak-like sucker. This latter, however, is fleshy and retractile and in the specimen represented, being drawn within the head, is not seen. On the margin of the abdominal segments are the circular orifices of the tracheae or breathing tubes, which in insects convey air to all portions of the body and act instead of lungs. Some parts of the abdomen are so transparent that the larger of these tracheae are shown in the photograph.

No. 3. Crab-louse (*Phthirus pubis*) magnified 80 diameters. Negative No. 519, new series. In this insect which is very similar in structure and habits to the head-louse, the sucking beak is also retractile. The specimen, which represents a female insect, is, however, so transparent that the outlines of the sucking apparatus can be seen in the photograph. Short antennae project on each side of the head. The anterior legs on each side are comparatively slender, the four others terminate in the great crab-like claws from which the insect derives its name. Round openings into the tracheae such as are shown in the photograph of the head-louse can be seen near the margin of the thoracic, as well as of the abdominal segments, and in several places the tracheae themselves come into view through the transparent skin. The bristles which occur on the abdomen and legs, are more sparsely scattered than on the head-louse.

No. 4. Louse of the dog (*Hemutopinus piliferous*) magnified 80 diameters. Negative No. 515, new series. The general resemblance of this parasite to the human head-louse will at once arrest attention. Aside, however, from technical distinctions, the swollen abdomen of the dog-louse and the great number of stout bristles with which it is beset will serve to distinguish it. It may here be mentioned as a matter of interest that the popular idea that each animal has its own peculiar parasite, which occurs on no other creature is not strictly correct. A number of instances are mentioned by Denny\* of the occurrence of the same parasite on several different animals. This would especially appear to be the case

\*An essay on the British species of parasitic insects. By Henry Denny, London, 1842.—Preface.

among birds, the same louse often infesting a number of allied species, but among quadrupeds such a community of parasites is less frequent. The number of different species is so large that as long ago as 1842 Denny figured over two hundred belonging to mammalia and birds, without doing much more than making a preliminary survey of the subject.

Still more limited is our present knowledge with regard to the parasites of insects; as to which, however, it is well known that many genera and species of the gamasidae, a family of the acarina or mites, live parasitically upon the bodies of other animals, and especially upon the bodies of insects. Two examples are here offered selected from those species of the genus gamasus which occur parasitically upon beetles.

No. 5. Gamasus of the soldier-beetle magnified 45 diameters. Negative No. 505, new series. The prominent features of this mite, as shown in the photograph, are the oval body with eight hairy legs, each terminating in a small double hook; and the remarkable appendages of the head, viz—the two long stout mandibles, terminating each in strong scissor-like extremities; externally to these are the curved five-jointed hairy palpi or feelers.

No. 6. Appendages of the head of the same mite magnified 135 diameters. Negative No. 506, new series. The photograph displays in detail the external configuration of the mandibles and palpi. One of the claws of the left hand mandible is broken.

No. 7. Gamasus parasite on the burying-beetle (*Necrophorus*) magnified 90 diameters. Negative No. 508, new series. This acarus is less hairy as well as smaller than that just described, its mandibles are shorter and their scissors-like extremities more crooked, but a great similarity exists between the two.

No. 8. Anterior portion of the same gamasus magnified 135 diameters. Negative No. 509, new series. In this picture the appendages of the head can be more minutely studied.

Not merely do the acarina furnish parasites for insects; many species exist upon the higher animals. Some, like the *Demodex folliculorum*, which lives upon the human face, are quite innocuous; others, like the *Sarcoptes scabiei* or itch insect of man, are the recognized causes of distressing skin diseases.

No. 9. Acarus found by Bourgogne of Paris, on the bat, magnified 80 diameters. Negative No. 592, new series. The skin of this singular creature is beset with long hairs and each of the eight legs terminate in double hooks.

No. 10. Parasite found by Bourgogne, of Paris, on a species of fly (*Volucella*) magnified 80 diameters. Negative No. 522, new series. This parasite, which would appear to be, probably, some immature insect, I have been unable to identify.

The foregoing examples of insect parasites might be multiplied indefinitely did time and leisure permit, and much more satisfactory photographs could be produced if the specimens were submitted to some preliminary bleaching process.

I have the honor to be, General,

Very respectfully,

Your obedient servant,

J. J. WOODWARD,

Assistant Surgeon, U. S. Army.



WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Red Bug*

Magnified *30* diameters by *M. L. H. H. H.*  
Photo-Micrographic Negative No. *2000* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





**WAR DEPARTMENT.**  
*Surgeon General's Office, Army Medical Museum.*

*Head Larva*

Magnified *57* diameters by *Reeks* *2/8/06*  
Photo-Micrographic Negative No. *45* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





**WAR DEPARTMENT.**  
*Surgeon General's Office, Army Medical Museum.*

*Crab Louse*

Magnified *80* diameters by *Reed 1/2/06*  
Photo-Micrographic Negative No. *219* New Series  
By J. J. WOODWARD, A-st, Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT.  
Surgeon General's Office, Army Medical Museum.

*Larva of dog*

Magnified *80* diameters by *Reed* *2/24/11*  
Photo-Micrographic Negative No. *373* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





**WAR DEPARTMENT,**  
*Surgeon General's Office, Army Medical Museum.*

*Yemaerus of Soldier Beetle.*

Magnified *100* diameters by *Becker* *Phen.*  
Photo-Micrographic Negative No. *333* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Beak of Gymniscus of Soldier Beetle*

Magnified:  $35\times$  diameters by *Beck 1/10th*  
Photo-Micrographic Negative No. .... New Series

By J. J. WOODWARD, Asst. Surg., U. S. A.

By ORDER OF THE SURGEON GENERAL

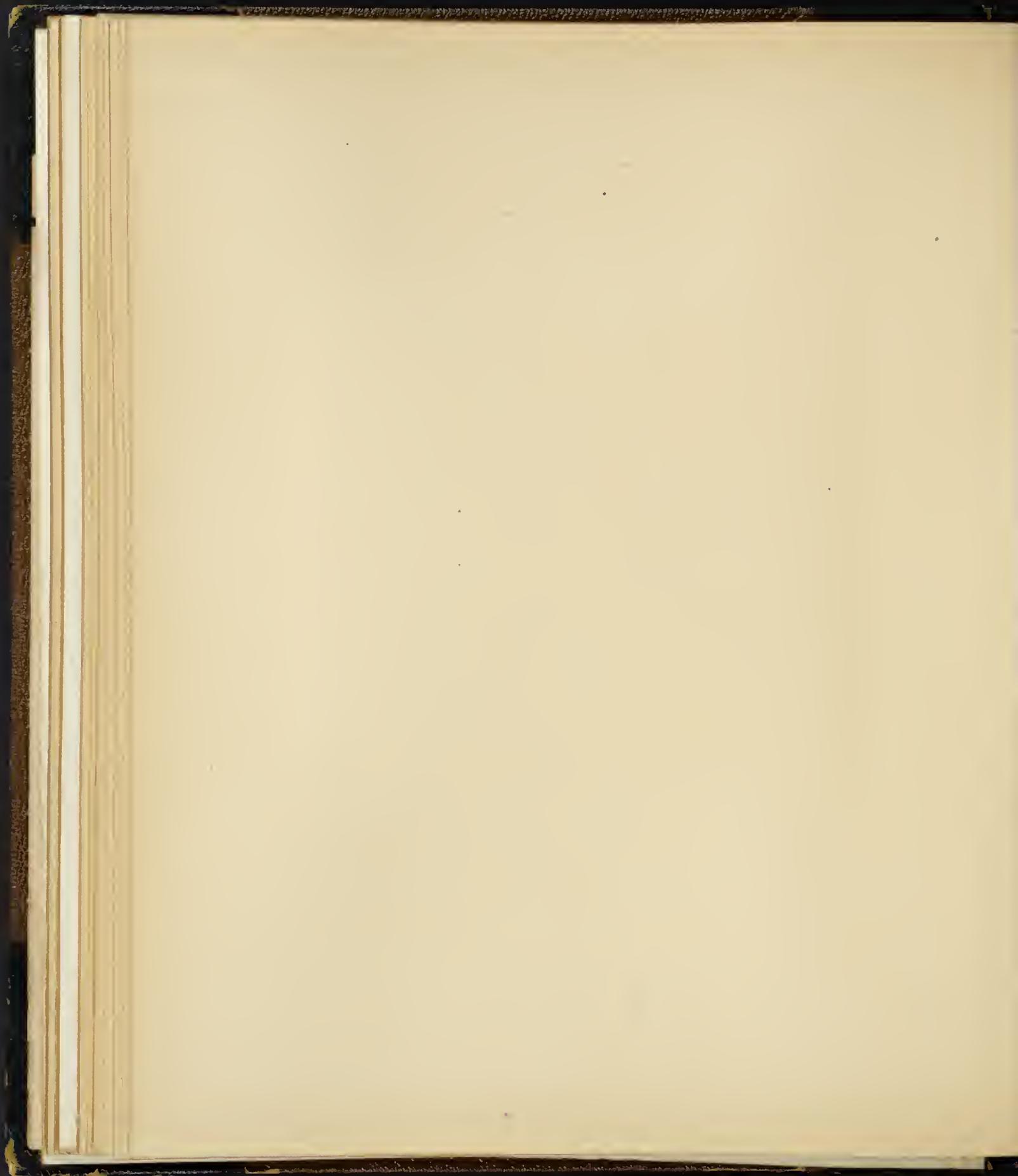




WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Gamasid of Burying Beetle*

Magnified  $40\times$  diameters by *Reek*  
Photo-Micrographic Negative No. *1111* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Anterior part of damarus of Burying Beetle.*

Magnified... 35 diameters by... *Recke 4/10/06*  
Photo-Micrographic Negative No. *724*... New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT.  
Surgeon General's Office, Army Medical Museum.

*Acarus of Rat*

Magnified *50* diameters by *Reek & Hart*  
Photo-Micrographic Negative No. *724* New Series.  
By J. J. WOODWARD, Asst. Surg. U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





**WAR DEPARTMENT,**  
*Surgeon General's Office, Army Medical Museum.*

*Parasite of fly.*

Magnified *80* diameters by *Beck's* *Appt.*  
Photo-Micrographic Negative No. *22* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.







Letter to the Surgeon General of the Army accompanying seven photographs of the probosces of certain flies.

ARMY MEDICAL MUSEUM,

January 15, 1872.

BRIGADIER GENERAL J. K. BARNES,

SURGEON GENERAL, U. S. ARMY.

GENERAL: The series of negatives of microscopic views of parts of insects, made by me during the last Christmas holidays, under the circumstances related in my letter accompanying the photographs of the Mosquito, embraces several views of the probosces of certain flies, copies of which I transmit herewith, with the following explanatory remarks.

The head of the common house fly, and of many other flies, bears, anteriorly, connected with its under surface a flexible, fleshy, trunk-like, proboscis or sucking apparatus, by means of which the insect absorbs its liquid food. Accounts of the structure of this organ are to be found in many entomological treatises, but perhaps the most satisfactory is that given by Mr. B. T. Lowmes in his monograph of "The Anatomy and Physiology of the Blow-fly," (London, 1870.)

Mr. Lowmes justly declares the proboscis of this fly to be "one of the most remarkable and complex structures found in the insect world." He describes it as consisting of three joints, its hard parts being the homologues of those usually found in the mouths of insects, but here greatly modified to fit them for their special functions. The basal joint is moved at the pleasure of the insect by five pairs of muscles. The walls of this joint are double and capable of being dilated into a cavity by the action of a pair of strong muscles. By its alternate dilatation and collapse this organ acts as a pump to draw up the liquids on which the insect feeds. The cavity is continuous behind with the oesophagus, and anteriorly with a hollow tube in the second segment, which leads to the oral orifice.

The terminal joint or segment of the proboscis consists of two large fleshy lobes, which, when at rest, are folded together, but when the insect is feeding are opened so as to form an oval sucker divided into two parts by a fissure which terminates posteriorly in a triangular orifice or mouth leading directly to the sucking tube. These fleshy lobes are channelled by numerous canals called false trachea, which are kept open by incomplete rings, and which lead to the sucking tube just above the oral orifice. "These" says Mr. Lowmes, "form a fine strainer through which the insect is enabled to filter the fluid from the solid portion of the substances on which it feeds."

For further particulars Mr. Lowmes's monograph may be consulted. The above sketch will serve to give some idea of these curious organs, which are but imperfectly shown in dried specimens such as were used for the preparation of the photographs, of which the following is a brief description.

No. 1. Gives a general view of the Wine-cellar Fly (*Drosophila cellaris*) magnified 16 diameters. Negative No. 532, new series. The photograph represents one of these flies carefully flattened out, so that the proboscis protrudes from the extremity of the head. It gives an idea of the size of the proboscis as compared with the bulk of the insect.

No. 2. Represents the same proboscis magnified 80 diameters. Negative No. 533, new series.

No. 3. Represents the same magnified 155 diameters. Negative No. 535, new series. Both No. 2 and No. 3 distinctly show the numerous transversely marked, false trachea of the sucking lobes, the tube of the second joint, and the thick massive first joint, which also has attached to it on each side two curious

club shaped organs well beset with bristly hairs; these are the palpi or feelers which some naturalists indeed believe to be more than mere feelers, organs perhaps of smell, taste, or even of both.

No. 4. Represents the proboscis of the Blow-fly (*Musca vomitoria*) magnified 42 diameters. Negative No. 536, new series. Considerable difference will be observed in the size and form of the sucking lobes, the number and shape of the false tracheæ, the shape of the palpi, &c., but the general structure is quite similar to that of the proboscis of the Wine-cellar Fly.

No. 5. Exhibits the fleshy lobes of the same proboscis magnified 80 diameters. Negative No. 540, new series. In this picture the false tracheæ and their circular rings, the central cleft between the two lobes and the triangular oral orifice, are well seen. The sucking tube of the second joint being dark-yellow in the preparation appears as a black streak in the picture. The size and arrangement of the bristles which beset the second joint and fringe the sucking lobes are worthy of notice.

No. 6. Represents the proboscis of the common House-fly (*Musca domestica*) magnified 85 diameters. Negative No. 541, new series. The parts are essentially the same as those of the Blow-fly though smaller and somewhat modified in form. In the preparation copied, the second joint of the proboscis has been broken and a part of its outer membrane turned to the left.

No. 7. Represents the proboscis of the Zonæ-fly (*Idiocella zonaria*) magnified 40 diameters. Negative No. 450, new series. This fly, in size and general appearance, resembles the Humble-bee. Availing herself of this circumstance the female fly enters the nests of the bees and lays her eggs, to hatch out voracious larvæ which prey upon the larvæ of the bee. The photograph is added chiefly because it exhibits the fleshy lobes of the proboscis, which is similar to those already described, in a partially collapsed condition. In the lower part of the picture, on the right hand side, may be seen a combination of lancets, produced by special developments of the maxillæ, mandibles, and tongue, (Lowes, loc. cit. p. 45.) which do not correspond to anything shown in the other pictures, and which therefore need no special comments in this place.

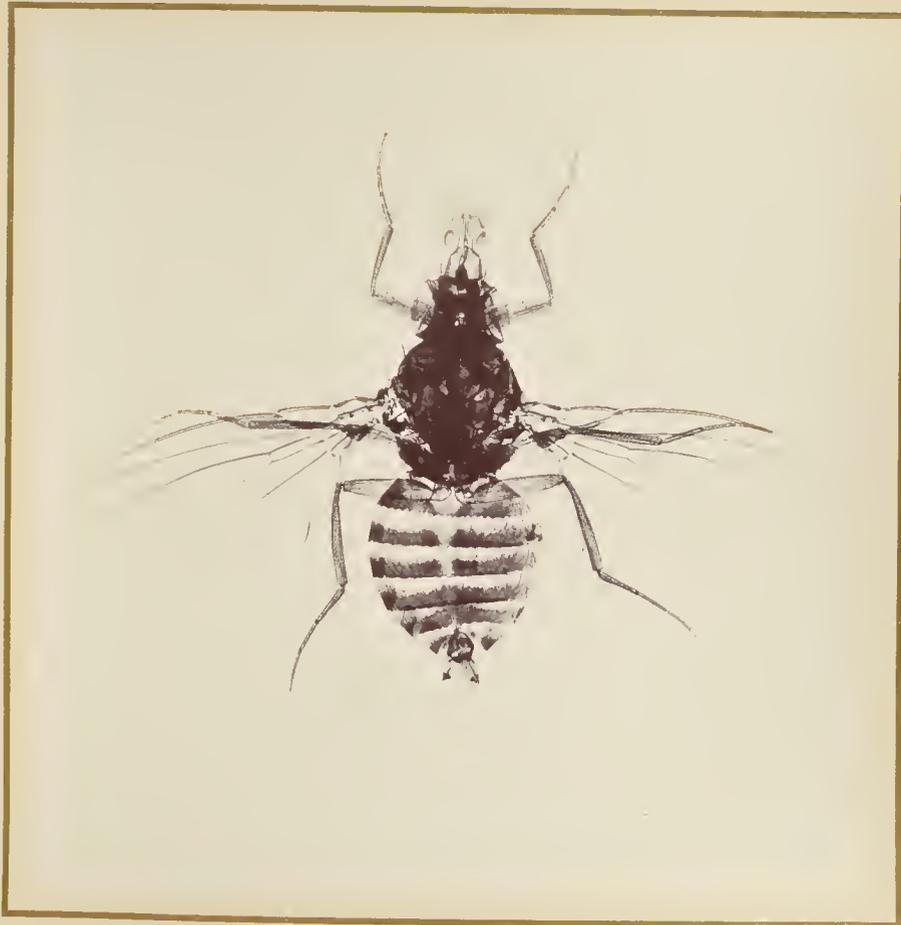
I have the honor to be, General,

Very respectfully,

Your obedient servant,

J. J. WOODWARD,

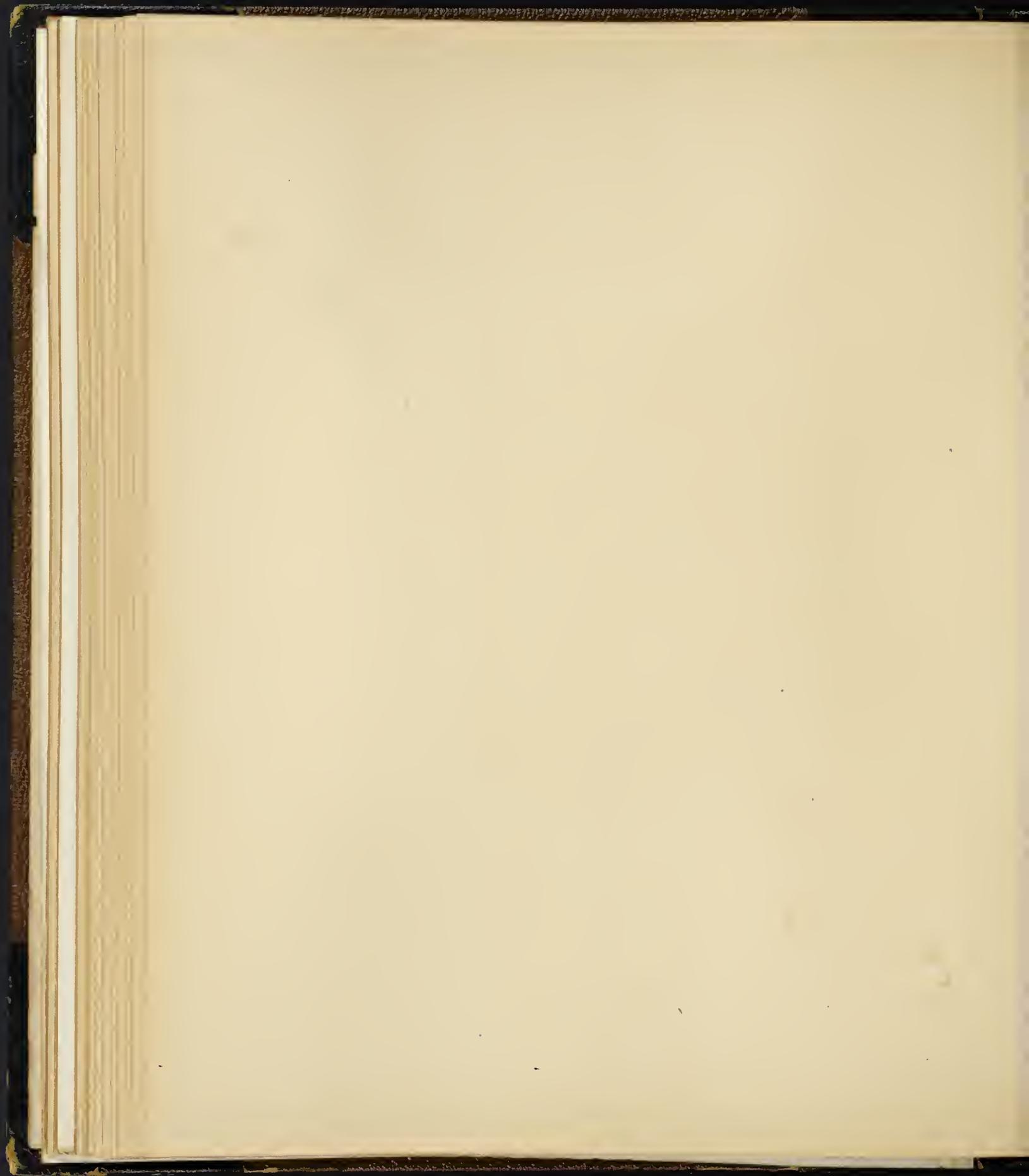
Assistant Surgeon, U. S. Army.



WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Minier-bellar Fly*

Magnified 16 diameters by *Reeks, Jr.*  
Photo-Micrographic Negative No. *J. 9* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
By ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT.

Surgeon General's Office, Army Medical Museum.

*Parabiosis of Microbellus Fly*

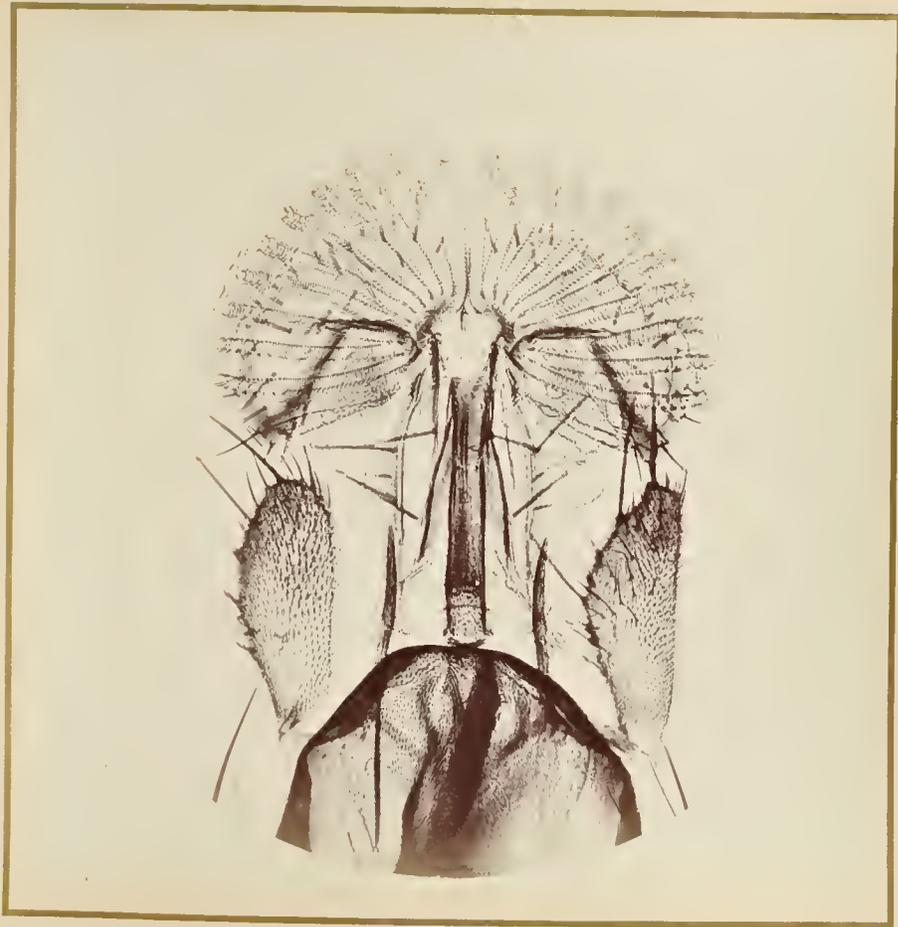
Magnified *80* diameters by *Beek's 2/300*

Photo-Micrographic Negative No. *1111* New Series

By J. I. WOODWARD, Asst. Surg., U. S. A.

By ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Prothorax of Minicollon Fly.*

Magnified *13.5* diameters by..... *Reck's 4/10/06*  
Photo-Micrographic Negative No..... *135*..... New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Produce of Blow Fly.*

Magnified  $\times 2$  diameters by *Reck's* *Micro*  
Photo-Micrographic Negative No. *2,36* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.

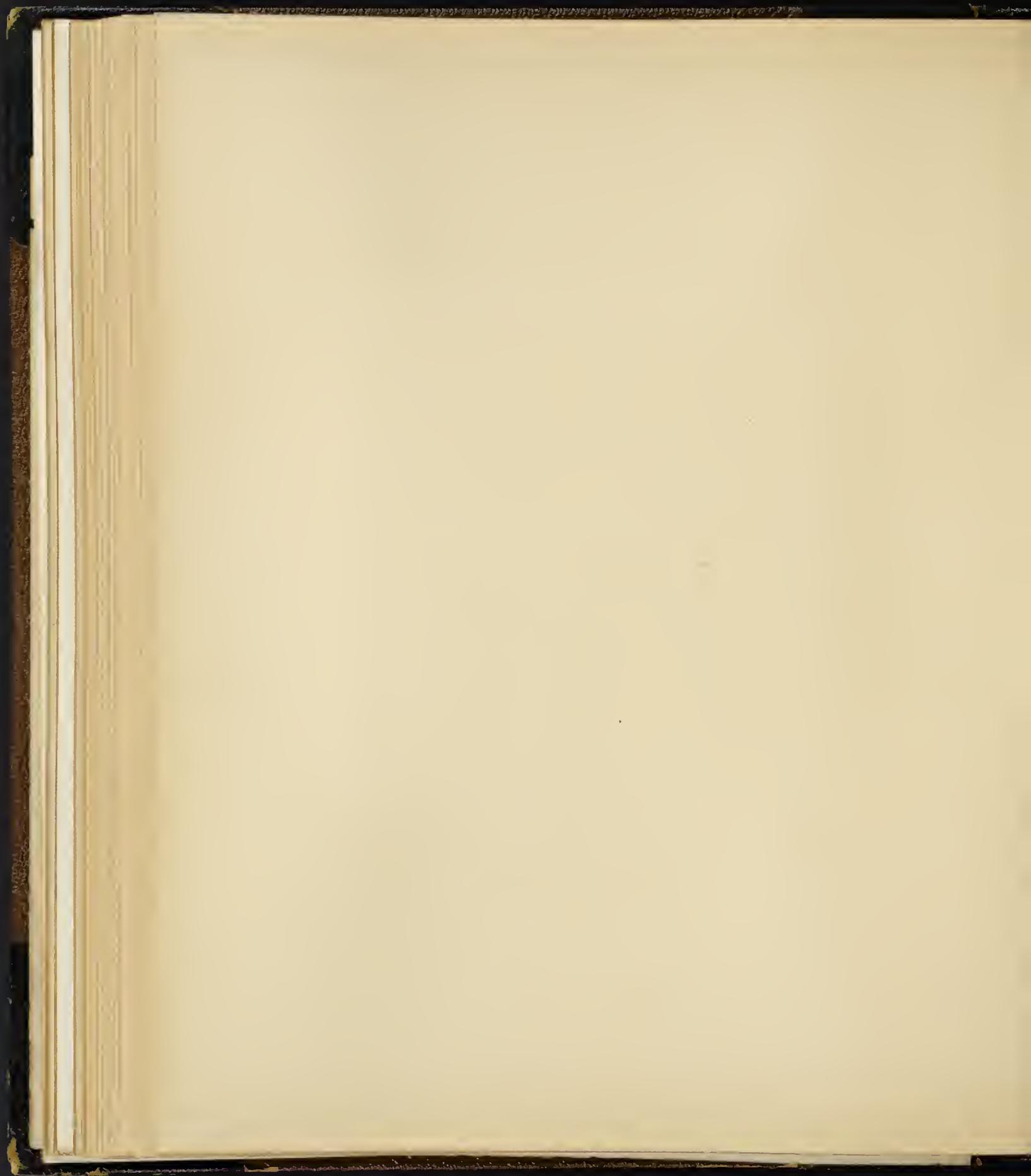




WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Proboscis of Blow Fly*

Magnified *80* diameters by *Beck & Co.*  
Photo-Micrographic Negative No. *1111* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Parotico of House Fly.*

Magnified  $85\times$  diameters by *Reich 2 1/2*  
Photo-Micrographic Negative No. *344* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT.  
Surgeon General's Office, Army Medical Museum.

*Protheca of Trypetid.*

Magnified *40* diameters by *Julius Thier*.  
Photo-Micrographic Negative No. *4436* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.







Letter to the Surgeon General of the Army accompanying eleven miscellaneous photographs of insects and parts of insects.

ARMY MEDICAL MUSEUM.

January 20, 1872.

BRIGADIER GENERAL J. K. BARNES,

SURGEON GENERAL, U. S. ARMY.

GENERAL: I transmit herewith prints of eleven miscellaneous photographs of insects and parts of insects, made during the late Christmas holidays under the circumstances explained in my letter accompanying certain photographs of the Mosquito.

The following is a brief description of the present series.

No. 1. Clawed Water-bug (larva of *Nauoris caucoides*) magnified 19 diameters. Negative No. 503, new series. This is the aquatic larva of an hemipterous insect. The posterior four legs are used in swimming. Anteriorly are two powerful grasping claws.

No. 2. Sailor beetle (a species of *Hydroporus*) magnified 19 diameters. Negative No. 504, new series. This is a small carnivorous aquatic beetle. The preparation was so yellow that many details are lost, but the head with its forceps-like mandibles or jaws and its many jointed antennae, the anterior dense wing cases or elytra, the posterior more delicate wings, and the six legs are tolerably well indicated.

No. 3. Head of beetle magnified 15 diameters. Negative No. 513, new series. In this view of the head and anterior portion of the body of an unidentified beetle (probably a species of *Tenebrio*) the toothed forceps-like mandibles, and the jointed antennae are more plainly shown. The mandibles or jaws of these insects work sideways, and not as in vertebrates up and down. They are flanked by the jointed palpi or maxillary feelers, while externally the many jointed antennae come into view.

No. 4. Part of the Eye of a beetle, magnified 400 diameters. Negative No. 517, new series. Few objects connected with entomology are more wonderful than the compound eyes of insects. The optic nerves instead of leading to vast numbers of rods and cones united into a single layer as in the eyes of the higher animals, terminate in a rather smaller number of cones and rods, each of which corresponds to a separate lens covered by a separate hexagonal segment of cornea. Considerably over a hundred of these segments are shown in the photograph, which represents a very small portion of one of the compound eyes. The precise number has been differently estimated by entomologists but in many species amounts to several thousands.

No. 5. Foot of Cockchafer (*Melolontha vulgaris*) magnified 80 diameters. Negative No. 514, new series. This beetle, so famous in the child-literature of Europe, is interesting in many particulars. The specimen from which the present photograph was taken serves to exhibit the anchor-like terminal hooks of one of the legs.

No. 6. Belted Wasp-fly (*Syrphus balteatus*) magnified 12 diameters. Negative No. 511, new series. This small but graceful fly exhibits at a glance many of the characters of dipterous insects. The head bears two long jointed antennae between which projects a needle like lancet or sting. The sucking tube to which this lancet belongs has been displaced in making the preparation and is seen externally to the left antennae.

No. 7. Buccal organs of Honey-bee (*Apis mellifera*) magnified 38 diameters. Negative No. 516, new series. The photograph exhibits the following parts. Centrally is seen the long flexible tongue or

proboscis (*lipula*) with which the sweet juices of plants are taken up. This is marked by a great number of transverse lines and beset with numerous hairs. On each side are the jointed labial palpi or feelers, while still more externally come the trowel-like maxillæ, which being concave inwards are used sometimes to ensheath the more delicate proboscis to enable it to penetrate into the depths of flowers, at other times perhaps to aid in smoothing and finishing the wax cells of the honey comb.

No. 8. Buccal organs of Dragon-fly (*Calopteryx*) magnified 40 diameters. Negative No. 520, new series. This photograph exhibits the formidable toothed mandibles of this carnivorous insect.

No. 9. Ovipositor of Saw-fly (*Cimbex Americanus*) magnified 80 diameters. Negative No. 512, new series. The Saw flies, with their curious saw-like ovipositors, make slits in the leaves of shrubs and trees and there deposit their eggs. In several genera of these flies the deposition of the egg is followed by the development of a gall-like excrescence on the leaf in which the larva is hatched out.

No. 10. Young Spider (not identified) magnified 38 diameters. Negative No. 526, new series. This picture simply gives a general view of the conformation of a minute spider, showing the palpi, eight legs and body, all well covered with bristle-like hairs.

No. 11. Portion of the Buccal organs of a Spider magnified 19 diameters. Negative No. 510, new series. Below are seen the two powerful mandibles, each consisting of two joints, the lower being a crooked claw through which the secretion of a poison gland passes into any thing transixed; above are the curved hairy maxillary palpi or feelers. On the right is seen one of the palpi of a second head mounted in the same preparation.

I have the honor to be, General,

Very respectfully,

Your obedient servant,

J. J. WOODWARD,

*Assistant Surgeon, U. S. Army.*



WAR DEPARTMENT.  
Surgeon General's Office, Army Medical Museum.

*blanched Water Bug*

Magnified *11* diameters by *Reich's 4 in*  
Photo-Micrographic Negative No. *573* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Sailor Beetle.*

Magnified  $\frac{1}{19}$  diameters by... *Reich 4 in.*  
Photo-Micrographic Negative No. *2744*... New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL



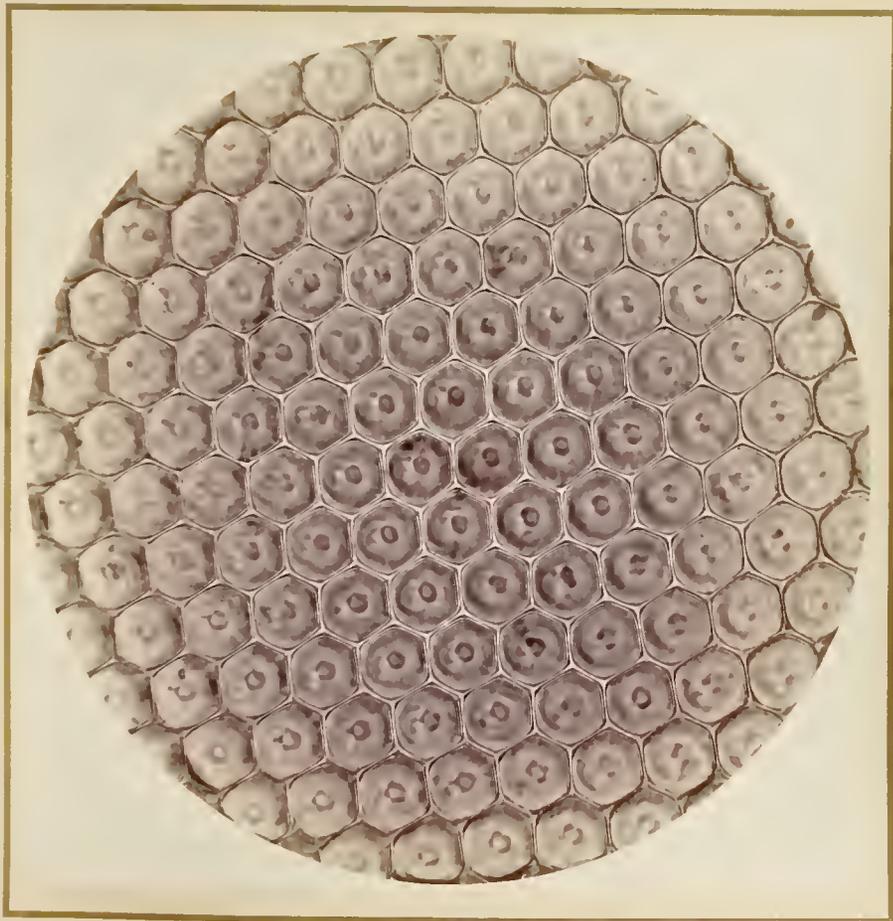


WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Head of Beetle.*

Magnified <sup>15</sup> diameters by *Becker H. H.*  
Photo-Micrographic Negative No. *573* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Eggs of Beetle*

Magnified 400 diameters by *Arnold Heald's immersion*  $\frac{1}{8}$ "  
Photo-Micrographic Negative No. *517* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

Front of back-chaffer

Magnified  $80\times$  diameters by Beck's  $\frac{2}{3}$  inch  
Photo-Micrographic Negative No. 5174 New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Belted Wasp Fly.*

Magnified... 12 ... diameters by... *Reck, H. W.*  
Photo-Micrographic Negative No. *1111*..... New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Succal Organ of Honey Bee.*

Magnified... 38 ... diameters by *Becke Min.*  
Photo-Micrographic Negative No. *516* ... New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Buccal organs of dragon fly.*

Magnified *40* diameters by *Reich's* *Tri*  
Photo-Micrographic Negative No. *526* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
By ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT.  
Surgeon General's Office, Army Medical Museum.

*Orifera of saw fly.*

Magnified *20* diameters by *Reck's Apoch*  
Photo-Micrographic Negative No. *517* New Series  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

*Young Spider*

Magnified <sup>38</sup> diameters by *Reeks* *H. W.*  
Photo-Micrographic Negative No. *726* New Series.  
By J. J. WOODWARD, Asst. Surg., U. S. A.  
BY ORDER OF THE SURGEON GENERAL.

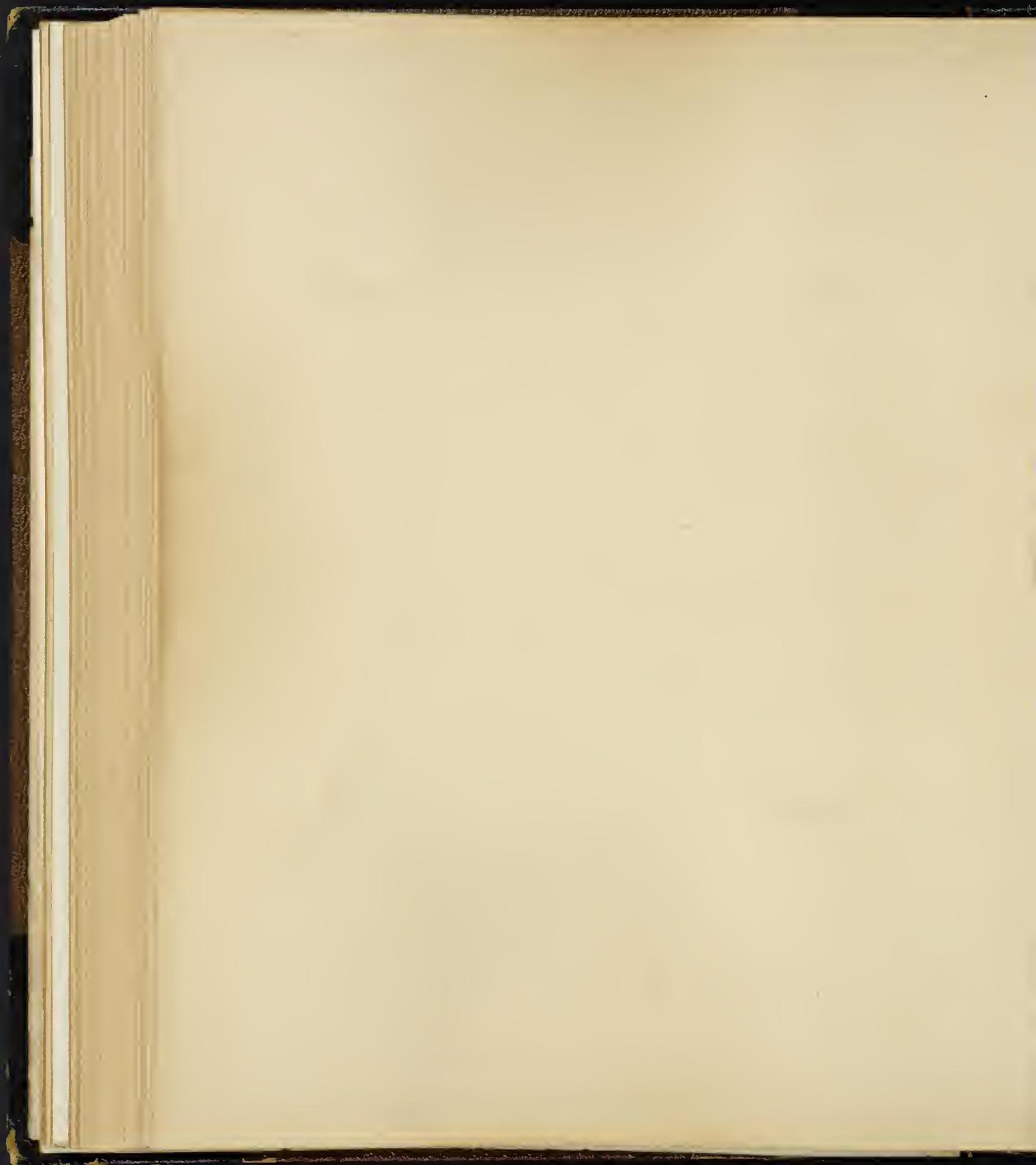


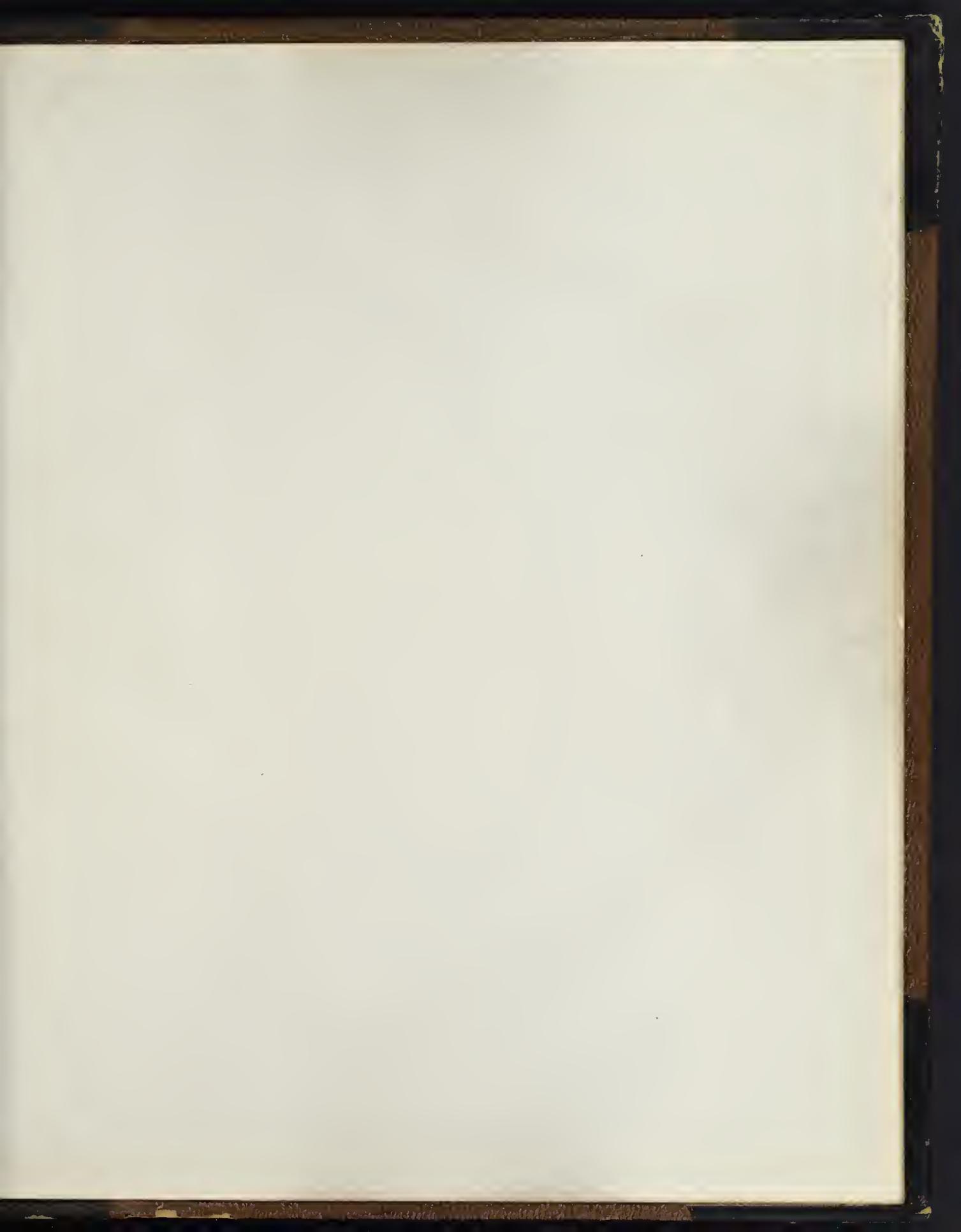


WAR DEPARTMENT,  
Surgeon General's Office, Army Medical Museum.

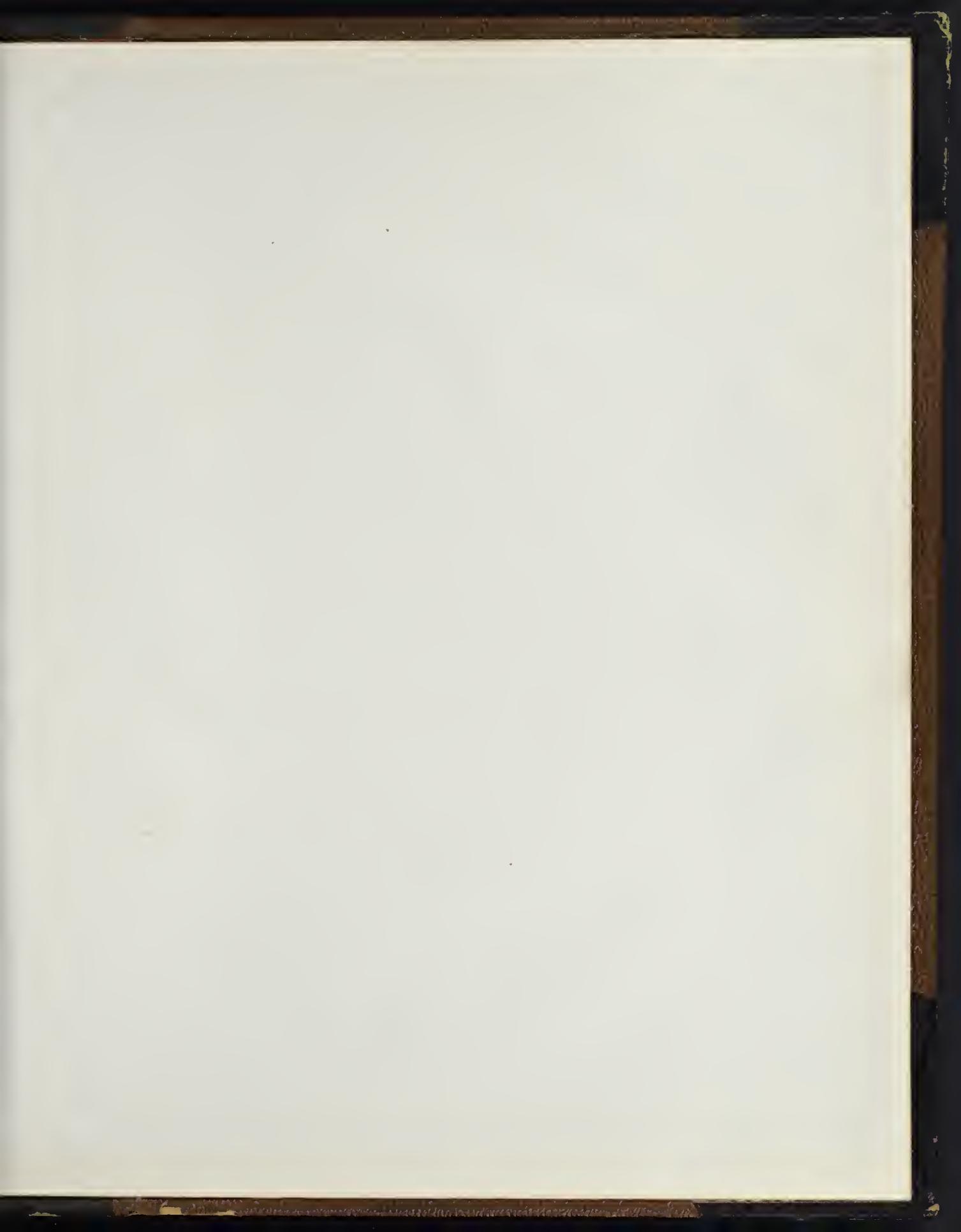
*Buccal Organ of Spider*

Magnified... 19. diameters by..... *Reeks* 3 in.  
Photo-Micrographic Negative No..... 572..... New Series.  
By J. J. WOODWARD, Asst. Surg. U. S. A.  
BY ORDER OF THE SURGEON GENERAL.





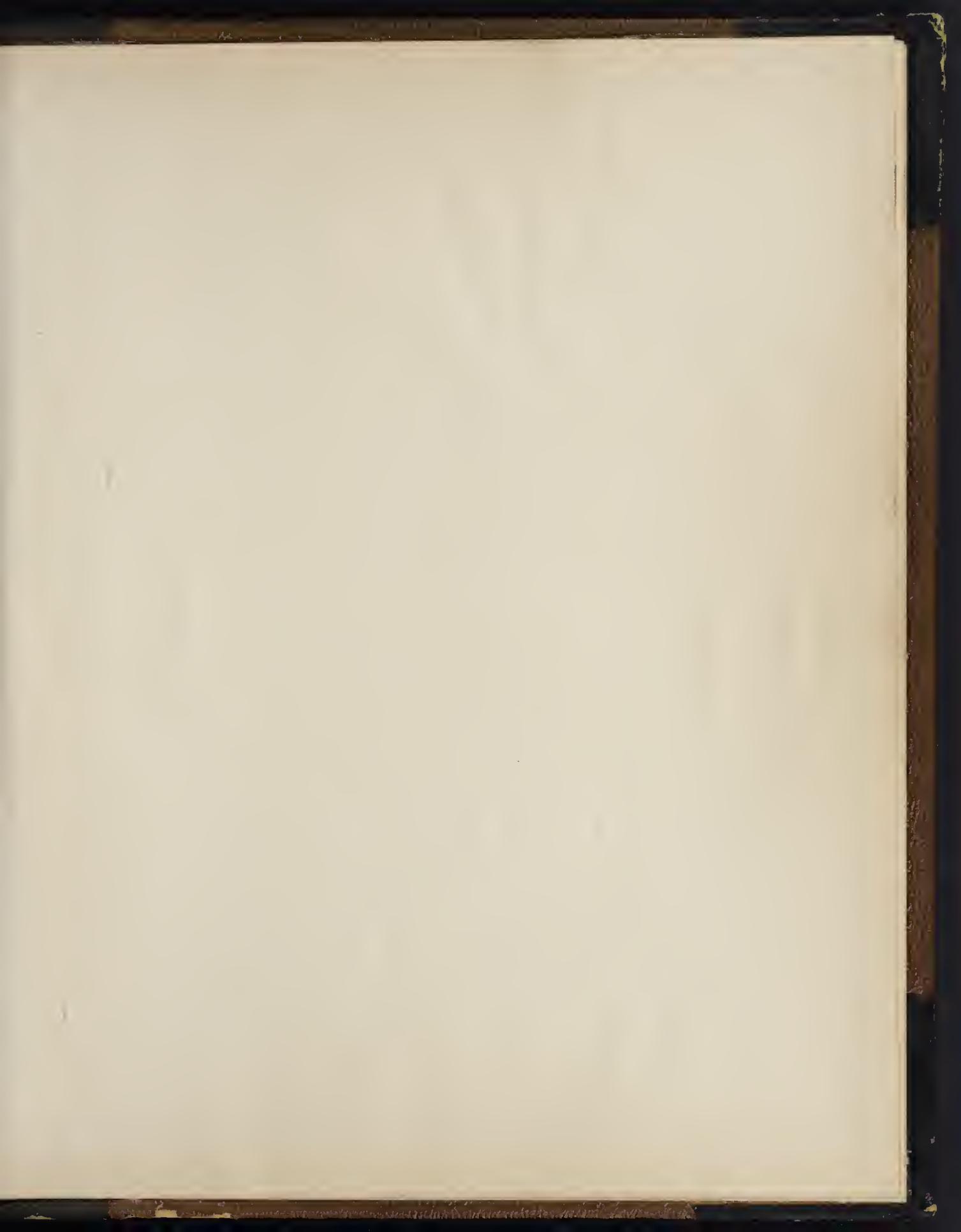


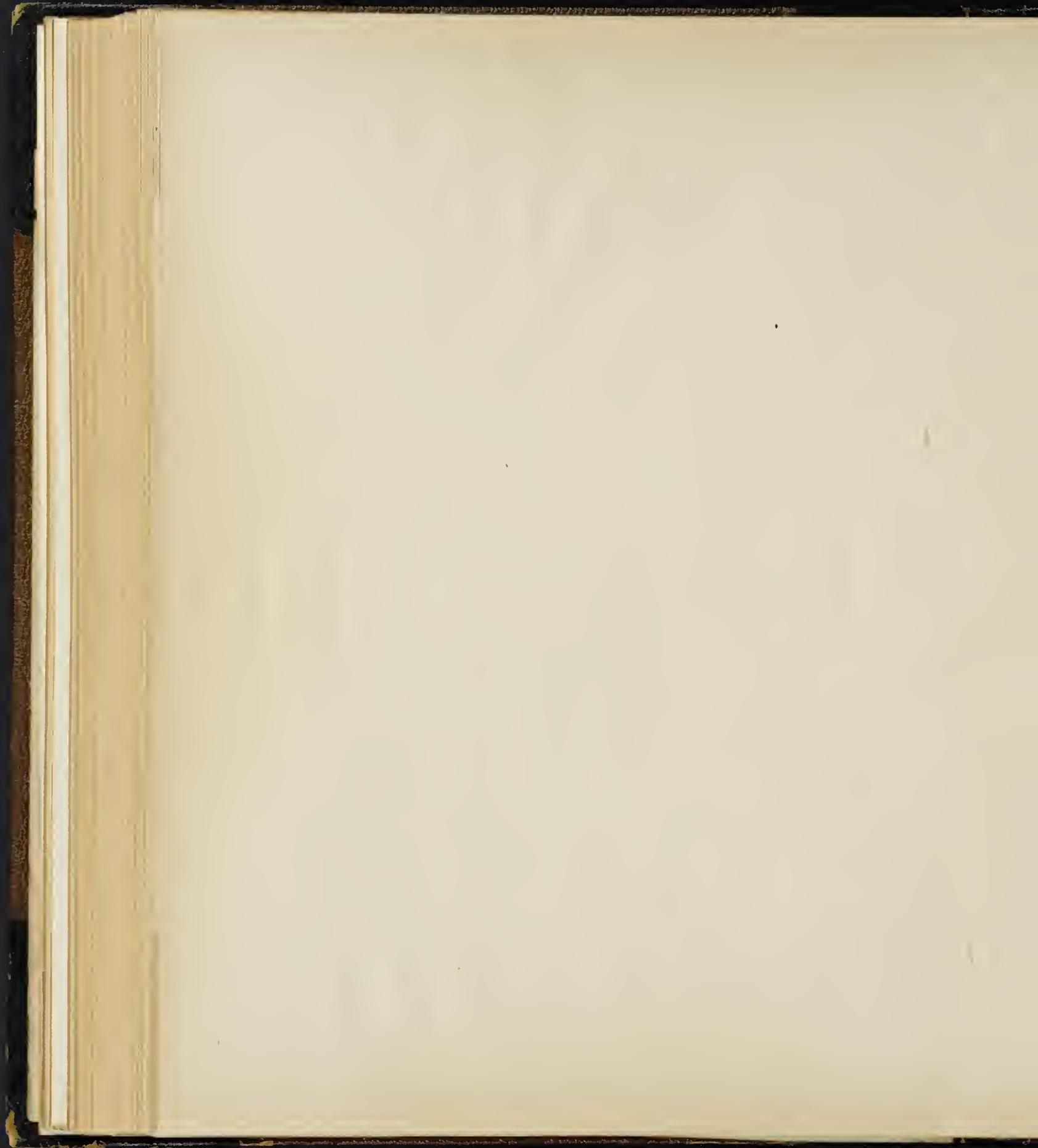


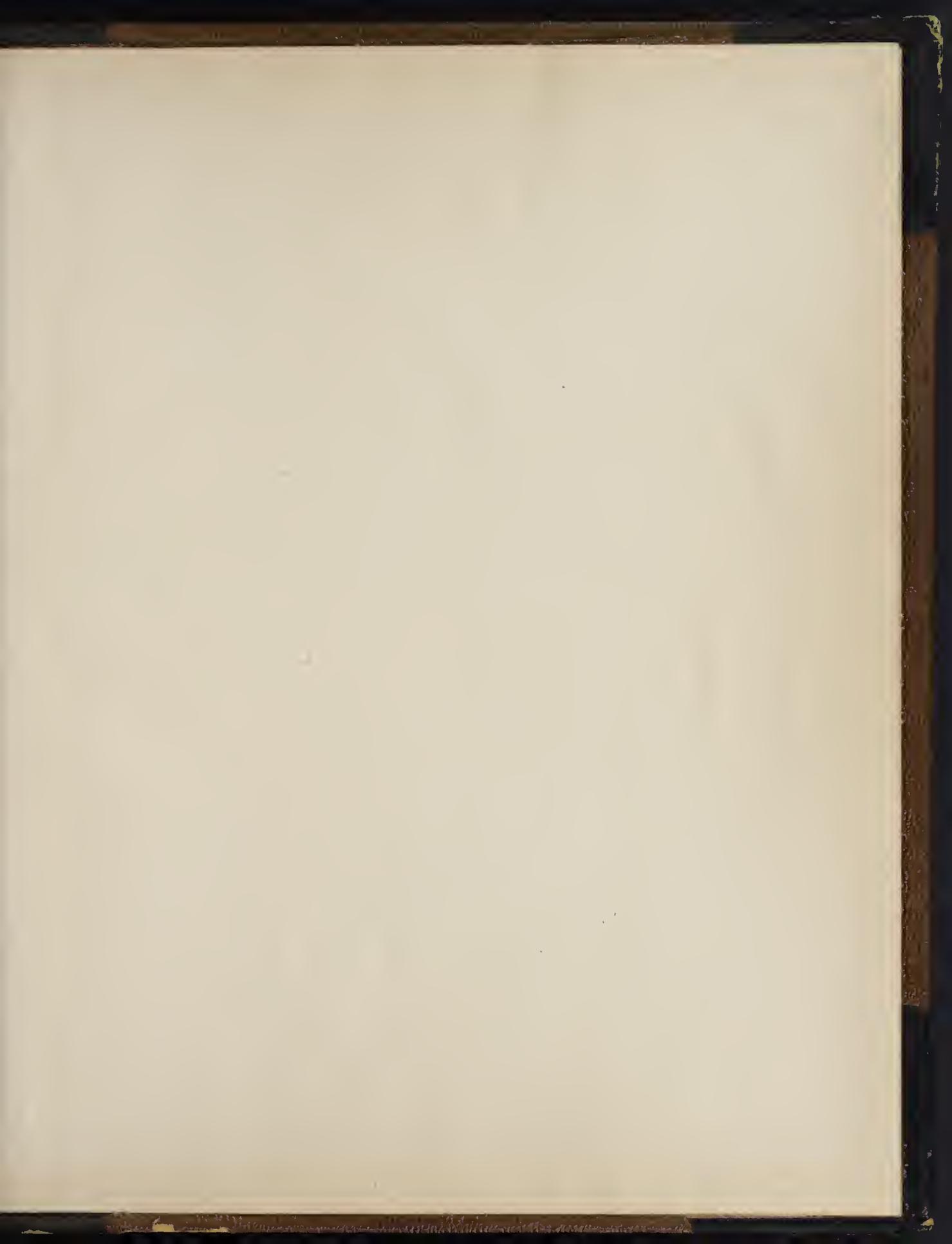




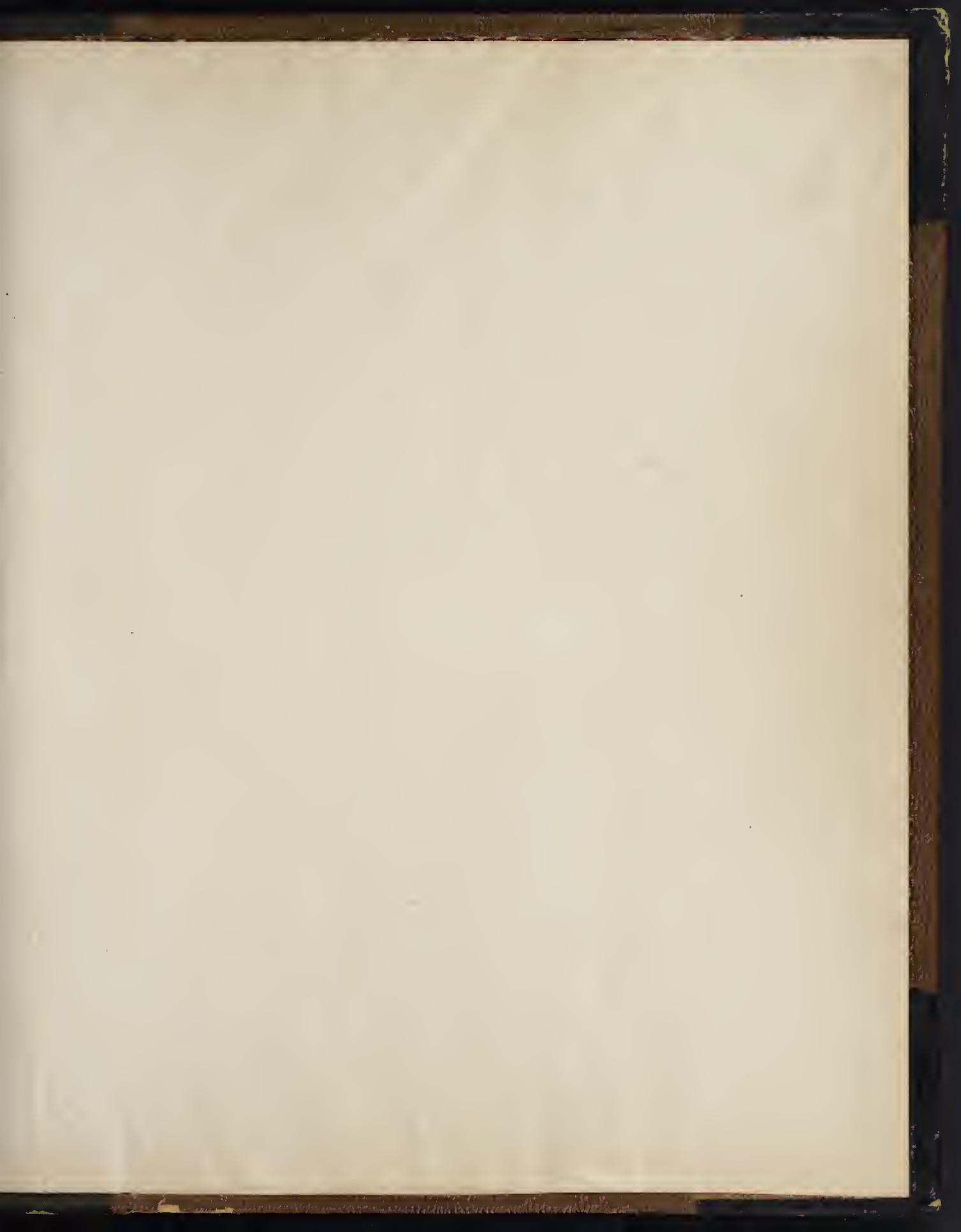


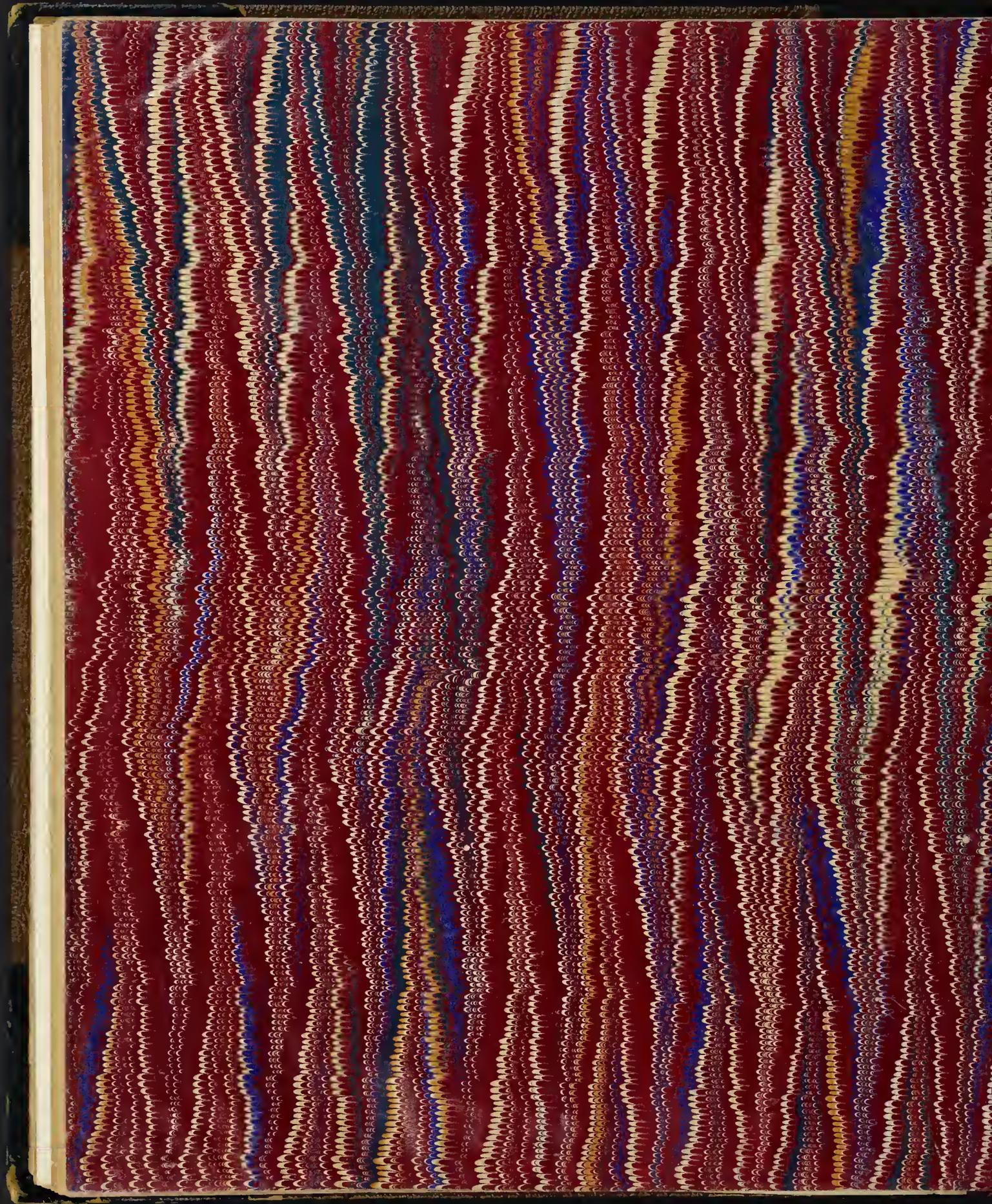




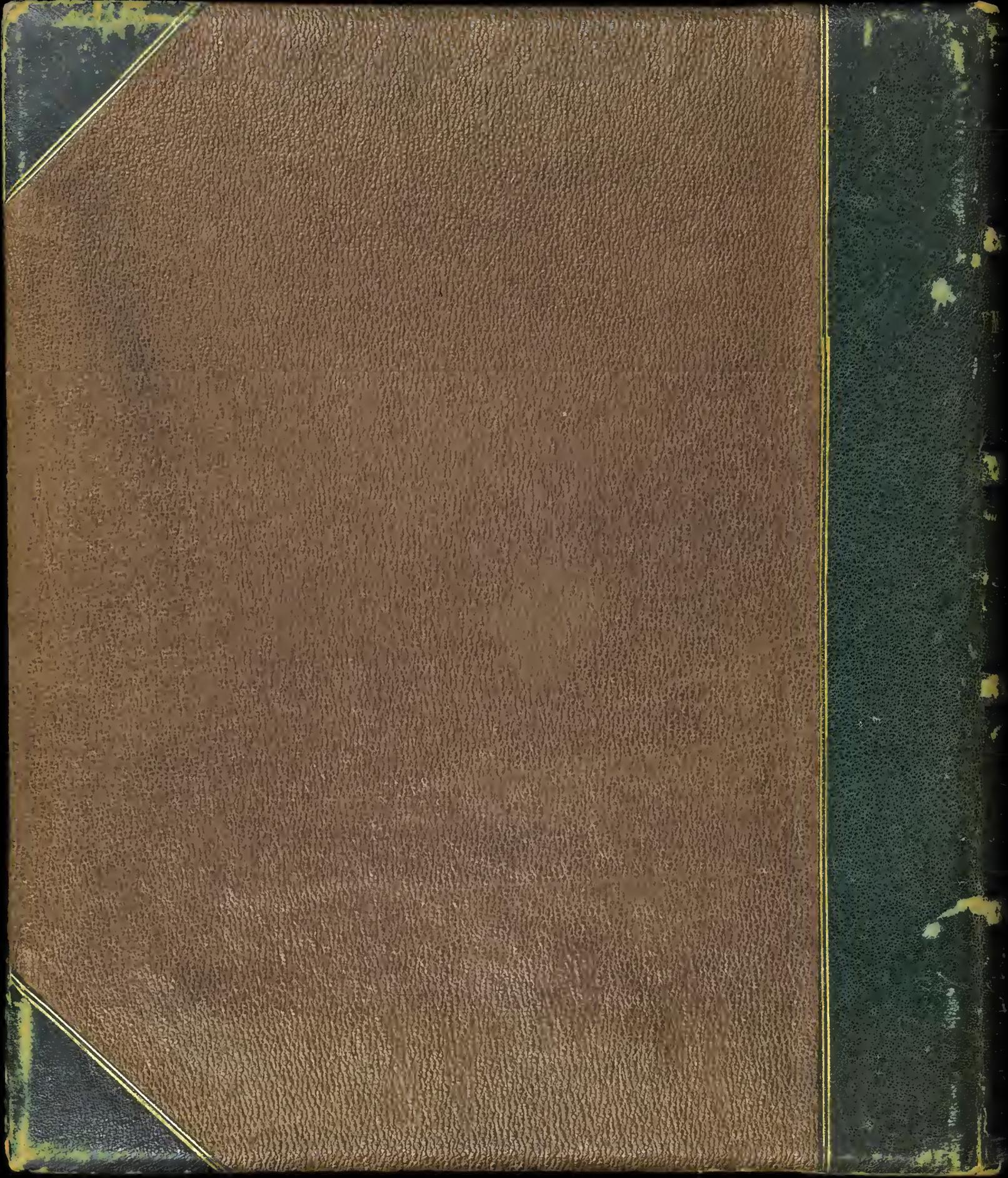












14 November 1979

Mr. Charles B. Wood III  
Box 98  
South Woodstock, Connecticut  
06267

Dear Mr. Wood:

I thank you very much for our pleasant telephone conversation last evening regarding the enclosed copy of Photo-Micrographs of the Mosquito & C. (ca. 1872) by Dr. Joseph Janvier Woodward. The book is in much better condition than I originally thought and contains all 34 mounted micro-photographs of various insects and insect anatomies.

The volume does not lack a title page or frontispiece and my own limited research--as well as haphazard experience--reveals that very few government publications contained either of these. With the exception of the partially missing text on page two, the copy is complete.

The provenance of this particular volume is as follows: The book was purchased September 15, 1973, from the Estate of Anabel D. Shifferstine, 21 Hunter Street, Tamaqua, Schuylkill County, Pennsylvania. Photo-Micrographs was included in the public auction which incorporated the collections, libraries, and holdings of Dr. C.B. Dreher, Dr. Edgar E. Shifferstine, and Anabel Dreher Shifferstine.

Following inquiries to several book dealers and rare book room librarians (who, unfortunately, do not specialize in this type of book and who, frankly, are not familiar with the work of Dr. Woodward), I tend to believe this volume is as scarce as it is unusual.

I hope you enjoy examining this interesting volume; if it should merit your consideration regarding an offer to purchase, please feel free to call me at my home after five o'clock.

Again, my thanks for your cordial telephone call.

~~11~~

~~Return~~

- 8 Bed bug
- 9 Head louse
- 10 Crab "
- " dog "
- 12 Soldier beetle
- 14 Beetle
- 19 Parasite fly
- 18 wine cellar Fly
- 25 water bug

~~11~~

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~~11~~

Text  
1111