Mercury in Natural History Collections

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Collection Materials

- Animal Specimens
- Herbaria
- Mineral Collections
- Cultural Objects

Origins

- Specimen preparation
- Specimen composition
- Applied pesticides

Corrosive Sublimate

has been yet sufficiently tested. Corrosive sublimate has been proscribed by Péron, the French naturalist, who enumerates its defects; but, carefully employed, and taking proper precautions to avoid its poisonous effects, it is highly effective in a variety of cases. The sublimate salt operates as a rapid, enduring, and energetic desiccating medium, reacting powerfully upon all animal matter, modifying its character in a peculiar manner, and rendering the matter subjected to it unalterable when it has been sufficiently saturated. Exposed in the open air, it facilitates drying and prevents the slightest movement towards decomposition in the skins. The sublimate seems to combine entirely with the air; the liquor, which contains only a weak proportion of this very insoluble salt, is soon exhausted unless the precaution is taken to add fresh sublimate from time to time, as the process of saturation goes on. Finally, when the skins will no longer absorb the liquor, the preservative process is complete; they are then laid out to dry.

Birds' nests & eggs : with directions for preparing, stuffing, and mounting birds and animals. 1800.

No. 6.—Gardner's Preservative.

Arsenic, 6oz.	Camphor, 1oz.
Corrosive sublimate, 3oz.	Spirits of wine, ½-pint.
Yellow soap, 2oz.	

"Put all these ingredients in a pipkin, which place over a slow fire, stirring the mixture briskly till the several parts are dissolved and form one homogeneous mass. This may then be poured into a wide-mouthed bottle and allowed to stand till quite cold, when it will be ready for use. Of course, these

Practical taxidermy, Montagu Browne, 1884

Mr Waterton's Method.

Put a good large tea-spoonful of well pounded corrosive sublimate into a wine-bottle full of alcohol (spirits of wine). Let it stand over night, and, the next morning, draw it off into a clean bottle. When the solution is applied to black substances, and little white particles are perceived on them, it will be necessary to make it weaker, by the addition of some alcohol.

A black feather, dipped in the solution, and then dried, will be a very good test of the state of the solution: if it be too strong, it will leave a whiteness upon the feather.

The taxidermist's manual, Thomas Brown, 1833

gentleman's hall. No better or more effective way of doing this is to be found than plunging them entirely in a bath composed of:

No. 17.—Carbolic Acid Wash, No. 3 ("Poison").

Carbolic acid, 1lb.	Sal ammoniac, ½oz.
Corrosive sublimate, 3oz.	Pure tannin, 4oz.

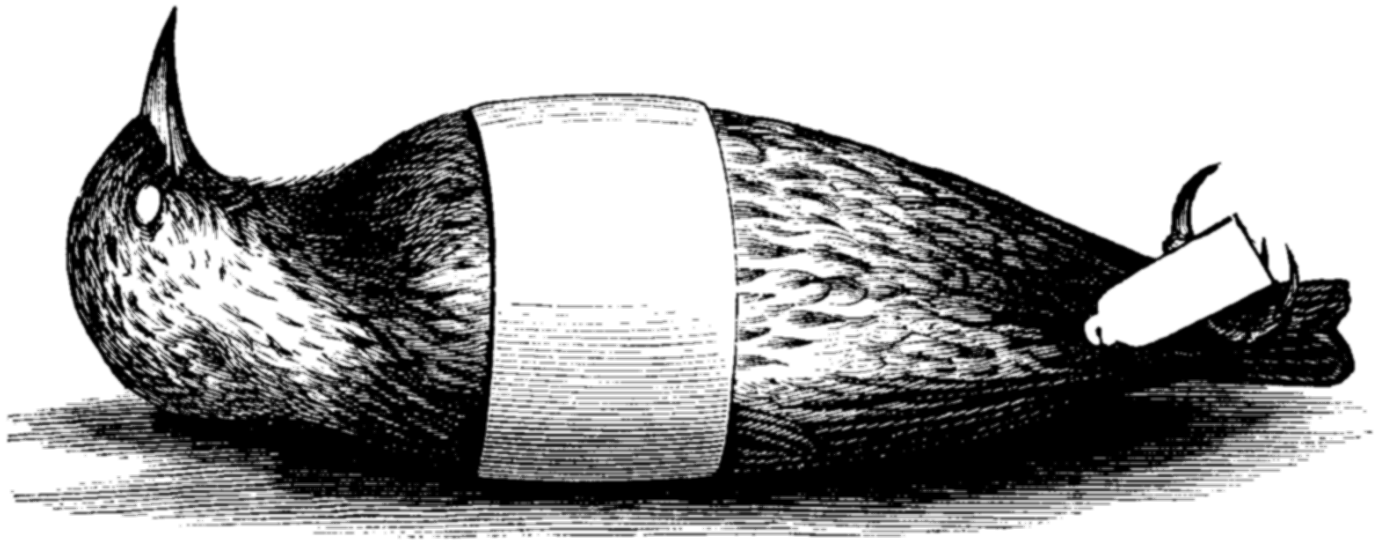
Hot water, 4 galls.

Mix this up in some out-house, or in the open air away from the house, if a fine day; and when the mixture is cold plunge the heads or skins in, holding the former by the horns, and stirring the latter about with a stick; in fact, allowing the mixture to touch the hands as little as possible.

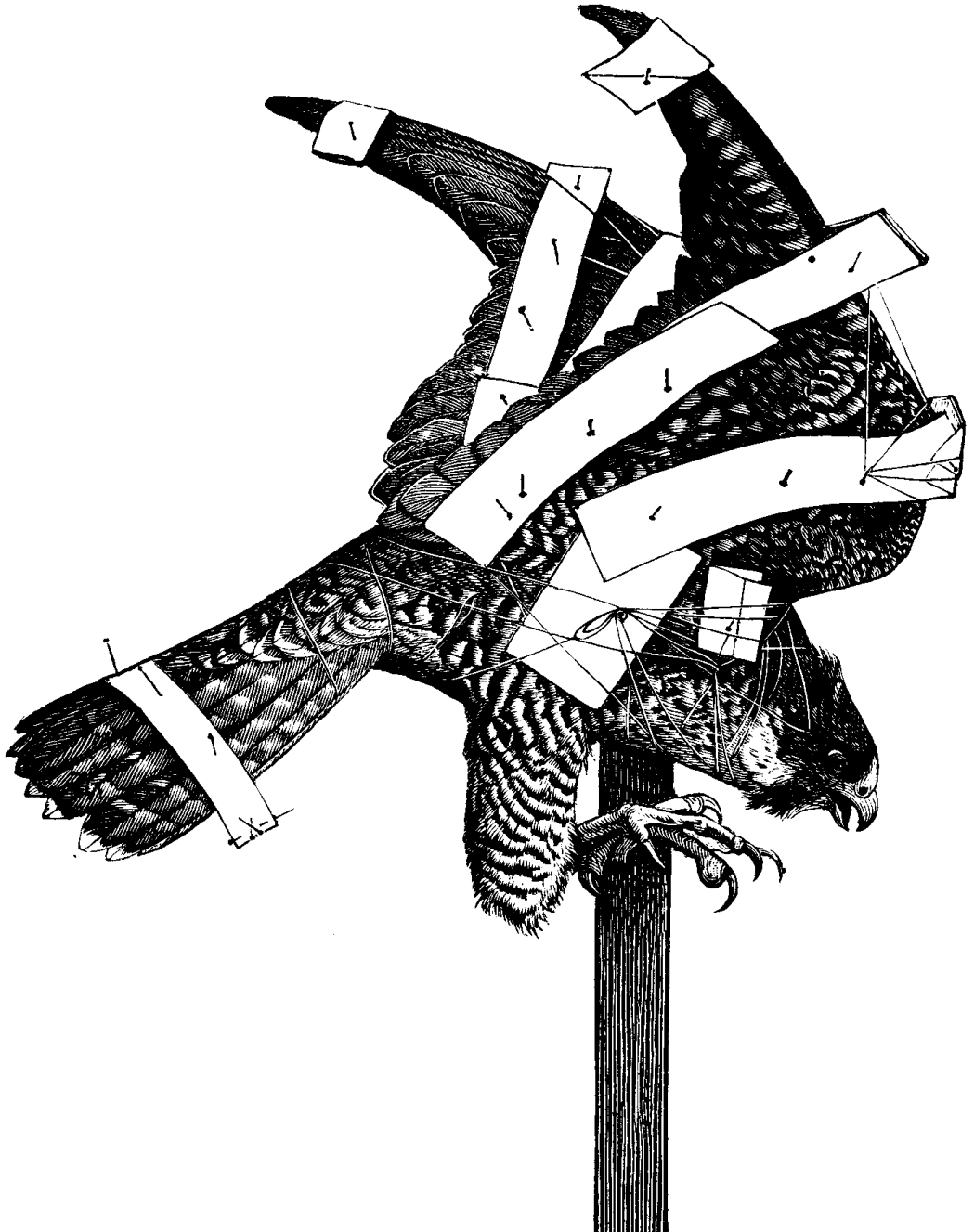
Practical taxidermy, Montagu Browne, 1884

Animal Specimens: Corrosive Sublimate

- Taxidermy
- Study Skins

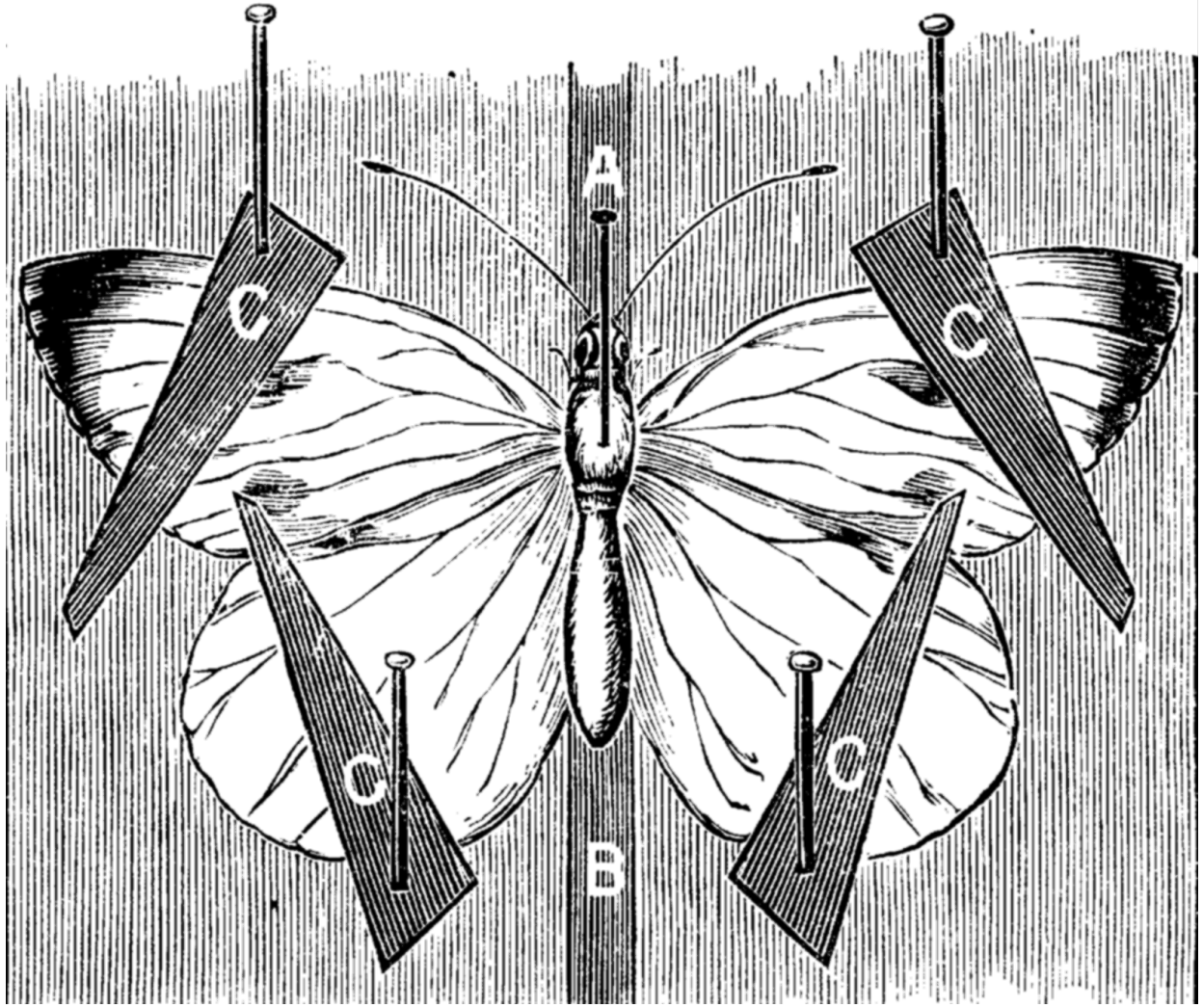


Practical taxidermy, Montagu Browne, 1884



Animal Specimens: Corrosive Sublimate

- Taxidermy
- Study Skins
- Pinned Insects, including enclosures

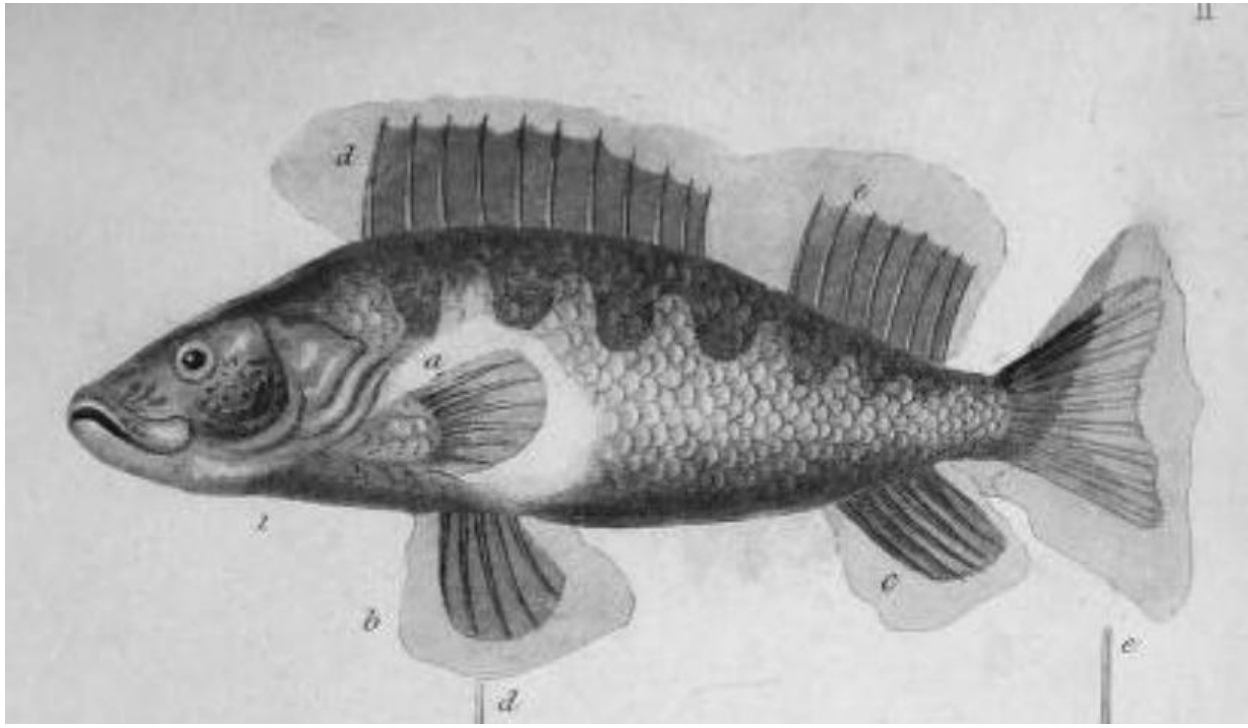


Practical taxidermy, Montagu Browne, 1884

Animal Specimens: Corrosive Sublimate

- Taxidermy
- Study Skins
- Pinned Insects, including enclosures
- Eggs
- Fluid specimens

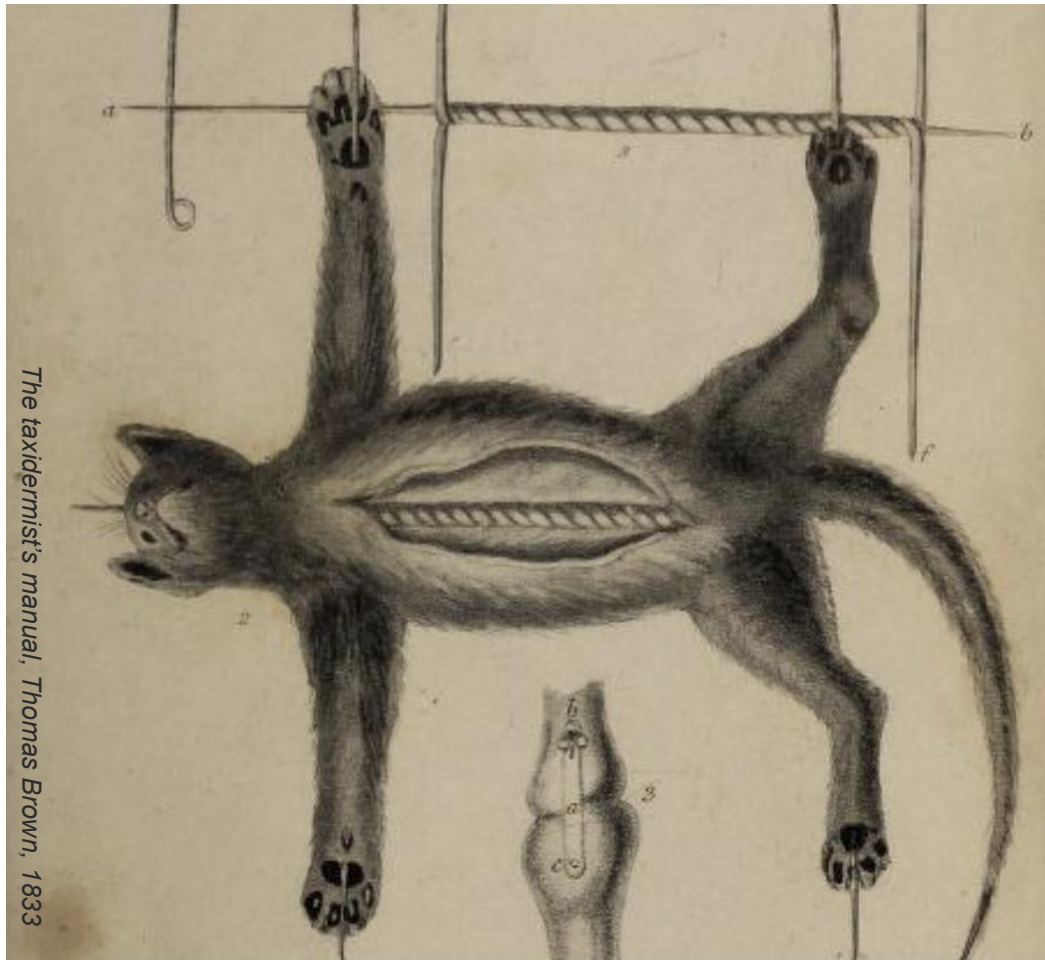
Delaware Museum of Nature and Science



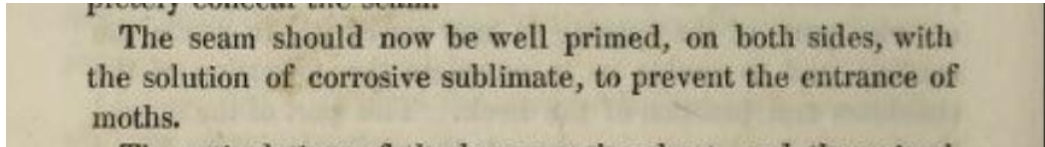
The taxidermist's manual, Thomas Brown, 1833

Corrosive Sublimate: History of Use

- **Late 17th–early 18th C**: earliest documented use for specimen preservation
- **Mid–late 18th C**: use was explicitly recommended to collectors in manuals
- **Early–mid 19th C**: though recognized as toxic, its use becomes standard practice, especially in institutional settings
- **Late 19th–early 20th C**: health risks are emphasized in amateur manuals, and popularity of arsenic as an alternative increases
- **Mid-20th C**: decreased use, with a gradual shift away from use of heavy metals altogether



The taxidermist's manual, Thomas Brown, 1833



The seam should now be well primed, on both sides, with the solution of corrosive sublimate, to prevent the entrance of moths.

Corrosive Sublimate: Chemical Behaviors

Mercury-treated Protein

- Mercury, especially Hg(II), has a high affinity for thiol (-SH) and amino ($-NH_2$) groups
- Binds strongly and often irreversibly to side chains (covalent/coordinate bonds)
- Forms stable organometallic complexes, reducing mercury volatility

Mercury-treated Cellulose

- Mercury's interaction with cellulose (ionic bonds, adsorption) is weaker
- Hydroxyl groups in **unprocessed** cellulose tend to form more stable mercury salts
- The altered chemical structure of **processed** cellulose can facilitate the reduction of mercury salts to elemental mercury
- Offgassing from processed cellulose materials is typically faster and more pronounced

Geology Collections: Mercury Minerals

- Specimens originating in:
  - California, Oregon, Texas, Arkansas
  - China
  - Spain
  - Italy
  - Yugoslavia
- Older collections:
  - Inherited collections
  - Teaching collections

Geology Collections: Relative Concern

Mineral	Formula
Calomel	Hg_2Cl_2
Cinnabar	HgS
Coccinite	HgI_2
Eglestonite	Hg_4Cl_2O
Livingstonite	$HgSb_4S_8$
Mercury	Hg
Metacinnabar	HgS
Montroydite	HgO
Moschelite (rare)	Hg_2I_2
Schuetteite (rare)	$Hg_3O_2SO_4$

Geology Collections: Cinnabar

- Mercury(II) sulfide, HgS
- Most encountered mercury mineral
- Pigment, lacquerware
- Known to release mercury vapor


AMNH

AMNH


NPS


Minneapolis Institute of Art

Handling Precautions for Management of Dust & Vapor

- Use of common PPE (gloves, dust masks, lab coat)
- Ventilation
- Lab hygiene, dust management
- Labeling
- Use of enclosures for storage
- Avoidance of direct handling (ie. use of trays, etc.)

THANK YOU

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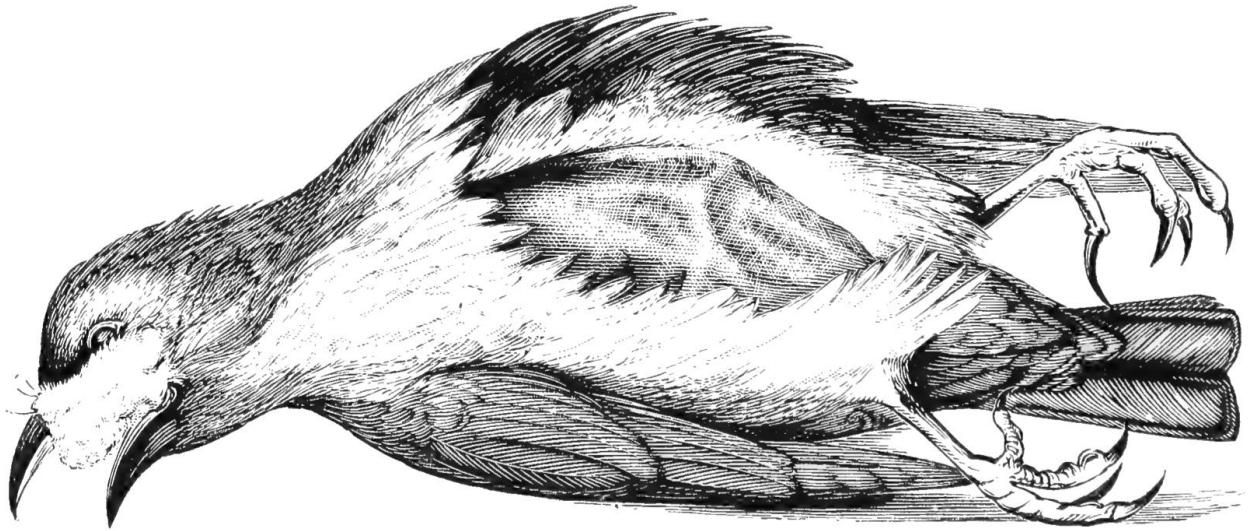
Nicole Childs
Jamie Newman
Lisa Goldberg



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