

Vennart's

School Days

McGill College

1865

BOC
134 G
M

DAVID ROSS McCORD
NATIONAL MUSEUM

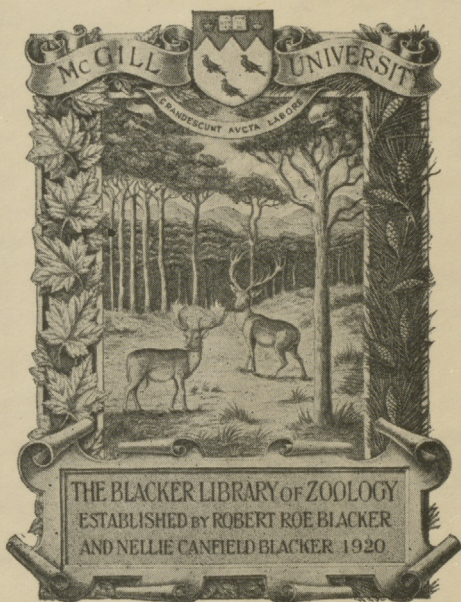
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McGill College
Montreal

Chemistry Course -

Days - Tuesday & Thursday

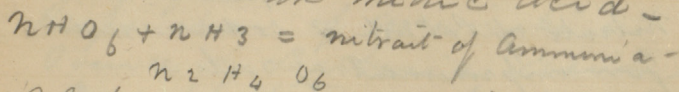
Hours - 11 to 12 P.M.

W. V. Vennor

Nov 1866

Ammonia - NH_3 -

Combines with nitric acid -



Colorless gas - soluble in water
collected over mercury - Laughing
gas -

Soil, rocks all air & water

Contain Ammonia -

nourishes animal & vegetable life -
In the muscles & blood -

Nitric acid & ammonia the only two
forms of Nitrogen -

Ammonia seldom seen in its pure
state -

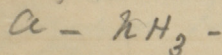
Solution - Aqua Ammonia -

Spirits of Hartshorn -

Gas completely absorbed by water -

Nitric acid & ammonia = nitrate of A.
Burning hair or wool gives off
a per centage of ammonia -

Animal matters give off
only rather vapours - with



NH_3 - first discovered by distillation
of Hartshorn or deer horn

Nitrogen - given forth by Spontaneous
Combustion or decomposition -
Nitrates of Potash & Soda - used
for improvement of soils -
Carbon -

In all organic bodies in large
proportion - Carbon Oxygen &
Hydrogen - forms fibre, tissue,
muscle -

Compounds of Carbon -

Carb. of lime -

Lime water a test for Carb. Acid -
Not a supporter of Combustion -

$\frac{1}{2}$ times heavier than H_2O -

Coal damp - Common in Caves
& mine shafts -

Gas test of lime & vice versa -

Can be collected over water -

Somewhat soluble in water -

Gas not poisonous - negative in
its action -

Ammonia & Carb. Acid combine
to form a solid - (Caustic Am-
forms Carb. of Ammonia -

Atmosphere - source of Carb-
acid gas in water -
Respiration of animals a
source of Carbonic acid -
Breath through lime water
& it will form Carb of Lime.
Vegetables give off their N
in form of Ammonia.
Acid action by test papers -
very feebly acid -
Nitric acid precipitates
Carb. acid - - -
Carbon a solid - not in its
pure state ~~can~~ exists only in
a solid form -
Most Common form Charcoal -
C. H. O. N - wood -
Heat sends off H. O. N &
leaves C or charcoal -
Impurities of charcoal -
Potash - Lime - &c &c remain
with the Carbon -
Ash - mineral matter in
Charcoal -
Opaque - hard - &c
Diamond - great weight
3 1/2 times heavier than water

275856

Hardest of all known bodies -
No Color & Transparent -
Combustion of diamond = Carb. acid
gas -

Graphite or Black lead another
form of Carbon - very soft -

Lamellar form of Crystal -

Specific gravity 2 -

Resists action of heat -

Diamond most condensed form of
Carbon & therefore hardest -

Graphite often contains iron
but not necessarily -

Also called Plumbago or Black lead -
contains no lead what ever -

Consists formed of black lead &
clay -

Charcoal absorbs Oxygen &
Carbonic acid -

Charcoal a disinfectant -
great power of oxidizing -

~~Charcoal & Carbon = Nitric acid~~

" " H. = water

" & Ammonia - Ni. Acid

Charcoal does not prevent decay
but favors it -

Additional points -

Carbonic acid gas - may be condensed by great pressure -

Liquid - powerful refractor -

when exposed to air & almost explodes - very cold - mercury

freezes within it - destroys tissue

of skin in the same manner as hot iron - (Anhydrous acid)

$\text{NO}_3 \cdot \text{HO}$ -

NH O_6 true acid -

It may be replaced by a metal

Carbonic acid + water $\text{C}_2 \text{O}_4 \text{H}_2 \text{O}_2$

This is the true Acid -

$\text{Ca}^{\text{H}} \text{O}_6$ Bi Basic acid -

combines with two bases -

two metals may be replace H -

Oxide of Carbon Colorless -

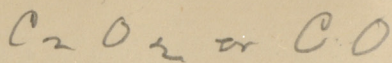
inodorous - insoluble in water -

burns with blue flame -

very poisonous gas -

Form in Common Coal fires -

Inferians even in small quantities.



However Carbonic acid gas
remains long in contact with
Coal - oxide of Carbon is formed.

Carbonic ^{oxide} gas used in re-
duction of metals -

In contact with air burns
with blue flame & great heat -
sufficient - for furning iron &
& steel -

Compounds of Carbon & Hydrogen -
ignite when intensely heated -

& form a colorless gas - H_2C_4 -
 H_2C_4 - Acetaline - new gas -

C_2H_4 - Marsh gas - Com gas -

decay of organic matter in
water - no odor when pure

& burns with pale flame -
not soluble in water -

~~C_2H_4~~ -

product of vegetable decay
in air -

This gas abundant in Coal
mines - found imprisoned
in Silurian & Devonian
formations -

Imprisoned in greatly condensed
form - forms in coal mine
Explodes in air when in
Contact with flame -

Western Canada gas in oil
shafts - Carburetted Hydrogen -
Springs in Lower Canada
as tarmines - of this gas -
(marsh gas) -

Some time used for other lighting
purposes - flame very pale

$C_4 H_4$ - Ethylene -

Occurs in small quantities
with marsh gas - in oil regions
when coal is decomposed at
red heat - & other organic
substances -

These three compounds set
free in formation of coal gas -
viz - $C_2 H_4$, $C_4 H_2$, $C_4 H_4$ -

also get some free H -

also CO_2 & $C_2 O_2$

also a large quantity of water
 $H_2 O_2$ & others -

Carbonic oxide very bad
in coal gas - injurious -

CO_2 Carbonic acid must
be got rid of - by lime -
Coal tar is also formed along
with these other gases -

Large quantities of ammonia
from distillation of coal -

C_2H_4 The rich ingredient
of coal gas -

See chapter of gas in Dana's
~~Mineralogy~~

Any organic matter when
heated gives off this gas -
Coal residue of distilled
coal also useful -

C_2N_2 - not formed in
nature - Cyanogen -

Read chapter on Atmosphere

a mixture of gases -
do not combine -

They pass themselves through
one another - Regulate the
at most phase -

Carbonic acids in very small
quantities - Water vapor
always dissolved in at most phase -

Ammonia also always present -
Combustion

Supposed to be an element named
Phlogiston - ~~is~~ an equivalent
to our Caloric -

Chemical processes always
very temperature - either to
heat or cold -

Chimneys in lamps are for the
purpose of creating strong drafts
to cause perfect Combustion -

Chlorine - $35 \frac{5}{10}$ or $35 \frac{1}{2}$

Chl. Bro. - Iodine -

always exist. in combination -
Sea contains 3 parts Corn salt -
Salt composed of Chlorine &
a base Sodium (a metal) -

Preparation -

* Per-oxide of manganese MnO_2
& Hydrochloric acid.

This last acid obtained by
combining Corn salt & oil of
vitriol -

The gas is heavier than air -
yellowish, green -

$2 \frac{1}{2}$ times heavier than air -
powerful odor -

Dissolves in water -

Supports Combustion -

destroys Coloring matters -
Ozone -

Chlorine sets forth oxygen -

& converts into ozone -

Bleaches by oxidizing substance
therefore acts indirectly -

Chlorine a disinfectant -

Chlorine H_2 mixed, in the dark
 & exposed to light explodes -
 or combines with great rapidity
 HCl combines with all
 substances to form bases &
 salts - chlorides -

Chlorine combines with Oxygen
 & forms - ClO ClO_2 ClO_3 ClO_4

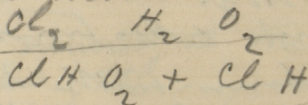
ClO_5 - & ClO_7 - + H_2O

of very little consequence -

ClO - 5 - & 7 - of most im-
 portance -

ClO_3 - Chlorous acid

ClO_2 Hypochlorous acid -



Cl Ca O_3

Cl Ca

Chloride calcium

~~Ox. Chl. Cal~~

Chloride of lime

Precipitate Chlorine by Nitrate
 of silver - from sea water &c

Cl_2, HO - Chloric acid

Reldom used -

Combined with Potassium -

$Cl K O_6$ - Chl of Potash

Chloride of Potassium -

Bromine - & Fluorine
Iodine -

Found very generally together
with chlorine - in sea water
& mineral springs -

80

Bromine - a dense liquid
element -

a deep red brown vapor -
bleaches like chlorine -

destroys all odors -

Burns & destroys the skin.

Combined with Hydrogen

to form Bromo-hydric acid -
always present in the sea
water - Br of Potassium -

Ether dissolves Bromine -

Ether not soluble in water -

Bromine combines with O
to form acids - but

These acids are of little
importance

Iodide - solid & highly
colored - in sea mineral
waters - Compounds soluble in
water - largely used in the arts
& medicine -

Plants have a power of secreting
iodine -

sea-weeds - gathered & burned -
an alkali first obtained -

pot ash & soda deposited -

a dense mother liquor left
behind charged with iodine -

Chlorine gives mixture a
dark color - & precipitates

Bromine -

affinities inversely as their
respective weights -

Iodine dissolved in spirits of wine
(Cinnica) -

Natural waters contain large
quantities -

In much larger quantities
in the ancient seas - than
the present seas -

Mineral Springs - always contain
Salt but also iodine & Bromine -
Test for Iodine in mineral
waters -

Ex - Solution of starch - mixed
iodide of potassium - add
Chlorine -

add to mineral water a little
starch & a very little chlorine -
too much chlorine & spoils test -

~~Generally~~
Before testing evaporate some of
the water & remove salt by ~~Crystallization~~
Crystallization -

Salts of Silver all affected by
light -

Iodine & Bromine much used
in Photography -

Iodine from two acids -

Flourine

D^r Hunt's

Christmas Examinations - 1865 -

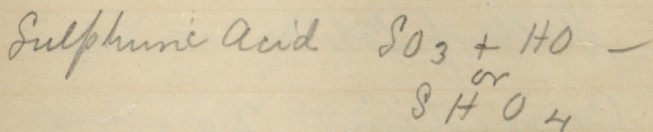
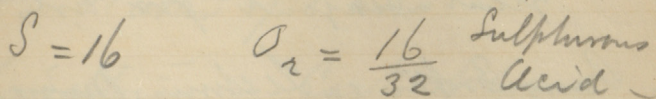
Chemistry - 1st year -

- 1 What do you understand by the laws of definite + multiple proportion
- 2 How is oxygen made, & what is the formula of chlorate of potash from which it is sometimes extracted.
- 3 How may ozone be made, what is its nature & what are its uses.
- 4 Say in how many ways hydrogen may be prepared, & describe one of them.
- 5 What is the formula of nitric Acid, & how is it prepared.
- 6 What is the Composition, & what are the properties & uses of ammonia.
- 7 In what does flame consist, & how can you show the structure of ordinary flame.
- 8 How is Coal gas made & how purified.
- 9 What are the properties & what the uses of chlorine.

10. How will you detect the presence of Chlorine in waters -
11. What are the equivalent weights of Chlorine, Bromine, & Iodine.
12. How can you detect the presence of Bromine, & how that of Iodine in mineral waters -

Lectures Continued - Jan 16th

Sulphur - can be distilled &
Condensed - in this manner
purified - see text book -



Iron pyrites used to obtain Sul-

Boils at 640°

great affinity for water -
used for drying air & gases -

Acid of commerce contains
a good quantity of lead -
from lead tanks.

Some waters of western Ca -
contain $SO_3 + H_2O$

- Metallic Sulphurets -
Compounds with the metals -

Copper lead iron &c
all as sulphurets -

H S - Sulphuretted Hydrogen -
Hydro sulphuric acid -

great reagent for tests -

Dung Boths - Lichens Mixed -
Salts of Potash or Soda

Ca or Lime 20

prepared by burning lime

Lime burning & slaking

Lime = $\frac{Ca}{14} / O_2$

Ca 20

O 2 16

H 1

dissolve in 500 parts water

as alk' acid & ammonia
rest of lime

Salts of lime

Carb & Sulphate of lime
or Plaster of Paris -

Limestone = Carb of lime.

Sulphate of Baryta very
insoluble substance -

Detect SO_4 by a
salt of Baryta acidulated
with HCl -

precipitate Sulph of Ba.

Baryta a strong poison -

effect destroyed by SO_4

see text book on lime -

Magnesia - nearly related
to lime -
used medicinally -

Limestone contain large
amount of Mg -

Mg Carb of lime -

Limestone in C. W. of
this description -

Limestone in C. E. chiefly
pure Carb of lime -

(Lime a very important
manure - acts upon the
soil by setting free such
substance as potash &c.)

Magnesia acts very
differently on the soil
has a deleterious effect -
in large quantities -

Analysis-

Water containing
Mg & lime -

As acid precipitates
lime & not Mg -

Phosphoric acid throws
down the Mg - in
shape of phosphate of Mg -

Phosphoric acid
Mg lime found in
ashes of wheat -

Magnesium wire - or
metal like zinc - soft
& flexible - fusible at a
low red heat - & with a
very brilliant light - owing
to its strong reflective power -

Magnesia formed - in the
form of white ash -

for every 12 grains of metal
there is 8 of ash -

dissolve in ~~Sulfuric~~ acid
add SO_2

neutralize with Am -

add Phosphatic Soda -
give precipitate -

aluminum - metal of
gl -
pipe clay contains
aluminous earth.

very light - about weight
of porcelain. nearly as
strong as iron.

$\frac{1}{5}$ weight of Copper -

combine with all year to
form ox of aluminum =

also combine with base -
all soils mixture of
sand & clay -

pure kinds of aluminous
earths used in the manu-
facture of porcelain.

Read use of Aluminous
Compounds -

Iron - F.E. 28.

Seldom found in native
state. (metallic state)

Iron obtained from Oxides.
very brittle - & easily worked.

Iron & oxygen -

$$\begin{array}{r} \text{Fe} \quad \text{O} \\ 2 \quad 3 \end{array} = \frac{28}{5} = \frac{70}{100}$$

Known as red hematite.

Red Hematite

Very hard - but brittle

Fe_3O_4 = Magnetic Iron

Iron stone also very abundant -

Metallurgy of iron -
Meteoric masses never oxidised by air -



Blast furnace
for
iron.

opening for
liquid iron -

Carbonic oxide reduces iron to the metallic state -

Carbonic oxide formed by placing the iron in excess of charcoal in Carbonic acid -

Charcoal & Iron ore well mixed with together in furnace -

Iron thus reduced very spongy
devoid of metallic luster -

Iron almost infusible
but united with Char
forms Carburet of Fe -
or Cast iron & so flows
out of furnace -

This iron full likely of
impurities - These im-
purities are melted or
removed by Fluxes -

Some Sand is -

If sandy ore use Ca

" limy " " Si -

These fluxes form Slags
on surface of metal

(1) Wrought iron - pure
& almost impure -

(2) Cast iron a compound
of Carbon & iron -

Iron, Platinum, Palladium
&c are some of the few
metals able to be welded.

Cast iron very brittle -
takes up 3 or 4 per cent
of Carbon -

Expels the Carbon & the
result is wrought iron -

by means of a Puddling
furnace - or Reverberatory.

De-carburized iron -

see text book on Iron

Cast steel.

see text book -

Cast hardening - by bringing
wrought iron into contact
with salts containing Ca.

wrought iron heated with
charcoal forms steel -

Cast-steel melts as easily
as Cast-iron -

new process by blowing
air through molten iron.

Compounds of iron
Salts of iron - 2

- 1 Protoxide $FeO = 28 + 8$
- 2 Sesquioxide $Fe_2O_3 = 56 + 24$
- { Peroxide - yellow salts -

Proto salts of iron seize upon
the oxygen of the air &
become per salts -
oxide of iron = iron rust

a double action -

seizes upon O & gives up
Carbonic Acid -

iron kept bright for a
long period in lime water.

Lime absorbs the Carbonic
Acid -

Acids of fruits attack
iron & give always
proto salts -

Peroxide used for dyeing
made in large quantities
by treating iron with
vinegar.

(Tannic Acid found
in astringent fruits)
gives a peculiar color
with a persalt of iron -

Tannic Acid & iron (or)
basis of all black dyes
& inks -

Tannic Acid present in tea
therefore gives a black stain
to iron -

Tannic A. - has hardly
any effect upon the
proto salts -

Color of ink destroyed by
acid - also by time -

Solution of yellow prussiate
of potash brushed over
old writing restores the
color -

Log-wood & nut galls the
bases of all our black
dyes -

acetate of iron - iron
treated with acetic acid.

Red oxide of iron made
by Calcining the proto-
salt -

Action of Salts of Sulphur
with salts of iron -

form Sulphurets of Fe -
It dissolved again by
any weak acid -

Red hot iron at once
melted by roll sulphur.
Sulphurets iron used
in the arts for obtaining
Hydrosulphuric Acid -

Iron in blood of all animals
& ashes of plants.

Manganese - Many -
much more advisable
than iron. Found often
with ores of iron

Proto salts - MnO

Salts of a pink linge
used medicinally -

Sesquioxide Mn_2O_3

Binoxide } MnO_2
or
Peroxide }

Manganic Acid

MnO_3

Per "

MnO_7

all these salts give up
their oxygen very readily -
Permanganate of Manganese -
used to purify water
& is a disinfectant -
destroys impurities that
~~only~~ by oxidation -
Add an acid & it is
decomposed & gives off
oxygen - or Ozone.

Iron ore analysed
by the Permanganate
of Manganese -

Nickel & Cobalt
much rarer than last metals

often found associated with iron & manganese

Nickel rather rare at present worth \$1.00 - 1.50 per lb. - used in the arts as an alloy.

alloyed with Cu, forms a fine white alloy = 'nickle silver'

American new cents Cu + Ni -

Cobalt salts always reddish - nearly always associated with nickel ores -

mixed with glass or any flux gives fine blue color -

used for porcelain painting

- 1 part Cobalt color several 1000 rd parts of glass -

present in nature in very small quantities

Cobalt -

found also in iron pyrites
in Canada in very small
quantities -

Zinc

- Less abundant than
iron - found as Carb or
Sulphate -

Burns but very slowly -
melted & poured in
water -

Zinc very volatile - at
a red heat - & burns
with white-blue flame -

Salts of zinc not poisonous -
but used as a tonic -

In dry air does not ~~oxidise~~
oxidise -

Zinc used to protect iron -
Galvanized iron -

Cadmium always associated
with zinc but in very
small quantities -

Chromium -

Hardly known in the state -
very infusible -

CrO - protoxide Cr

Cr_2O_3 - per " "

CrO_3 - Chromic Acid

Cr_2O_4 - little known -

oxide Chrome

Emerald green of Darnley

this green used in Bank

notes - very infusible.

Chrome ore = ox Cr & Fe -
when heated with potash
forms Chromate of KO -

This solution precip - the salts -

Zn -

Never in great abundance -
occurs as oxide of Zn -

Not attacked by weak acids -

Melts at much lower tem-
perature than lead -

Zn much used in alloying -

Zn & lead much harder
than lead itself -

Copper & Zn alloys of
a great degree of hardness -
Bronze -

Zn much used also in
alloying -

Purple Cassius formed by
Ferri chloride Gold
Proto " " Zn

Strong acids do not act
on Zn -

Nitric acid changes it to oxide

Arsenic - As - As -

Arsenic when exposed to heat
volatilizes before fusing -

forming Arsenic Acid -

Cobalt or Fly powder -
proceeds from Cobalt -

Cobalt of druggist - pure
metallie Arsenic -

Roasted in tube with
good supply of air - forms
pure white oxide of As
in upper part of tube -

AsO_3 Phosphorous Anhydride

AsO_5 - Phosphoric acid

This last acid not poisonous -

Sol in Amm - & precipitated
again by acids -

As - used in the Arts -
Combined with Cu - give
a green color -

Antimony -

Closely related to Arsenic -
x also combines with
2 x 3 atoms of Oxygen
used medicinally -
(See Fownes)

Like tin used in alloys
for various types metal -

Bismuth See Fownes -

Copper Cu - 31.7

does not oxidize in the
atmosphere -

Tests - ammonia
yellow precipitate of Potash

Iron Nickel Cobalt - are
not precipitated by H₂S -

H₂S added to Copper.
gives Sulphuret of Copper -

Cu - separated by other
metals -

Zinc precipitates Cu by
giving in exchange sulphate
of zinc -

Zinc acts in the same way
& precipitates the Cu in the
metallic form -

Decomposition something the
same as ~~is~~ in the pro-
duction of Hydrogen -

Lead - Pb - Lead -
(see Dana's Mineralogy)

Great degree of fusibility
easily oxidizable in the air.

Red lead, is formed by the
oxidation of lead.

Scum on surface of melted
lead. an oxide of Pb.

Acetate - Nitrate of lead -
all salts of lead very heavy -

Carbonate of lead very
soluble in acids - & even
in water -
HS at once detects lead in
water -

first test for Copper by
Ferrocyanide of Potassium.

Forms Compounds with HO SO_3 -
That are insoluble.

e.g. Sulphate of lead -
has not poisonous effects -

Iodide of lead a beautiful
Yellow Compound -

Give precipitates lead
in shape of crystals
e.g. - Lead tree -

The noble metals -

Metals which resist action
of fire - Gold, Platinum &c &c
Mercury -

Concals. 39° below Zero -

When exposed to the Air it
becomes oxidized at a very
low temperature - & forms
red oxide of mercury -
when again heated forms
again metallic mercury -

Mercury combines with oxygen
in two distinct compounds -

Mer - 200 + ~~80~~ -
Hg - " 100

Mercury dissolves in Nitric Acid

Proto salt = Mercurous

forms insoluble precipitates -

Corrosive Sublimato - a
Compound of Mercury -

See Fowns -

Iodate of Mercury -
a yellow compound turning
to orange colored -

Sulphuret of Mercury -
a deep red - Cinnibar -

Silvering by mercury -
a copper silvered by mercury.

Copper precipitate Mer.

Silver & Mercury
Gold & " "

Gold extracted from its
ores by mercury -

Silver -

Native silver occurs with
Copper on the shores of Lake
Superior.

Commercial lead contains
silver -

Properties of silver & lead
very much alike -

Lead oxidizes much more
readily than silver.

thus silver may be parted
from lead - by oxidizing
oxidizing lead & removing
oxide -

Salt of silver - Nitrate of silver -
formed by dissolving silver
in nitric acid -

Ex - a silver coin dissolved
in nitric acid - gave
a green solution containing
a salt of silver & some
gold -

Copper precipitates the
silver from the solution -

HCl. acid at once
precipitates silver - as
chloride which is insol
in water or dilute acids -

Silver coin blackened by
presence of sulphur -

Gold -

Very indifferent to all
chemical action -

when melted of a greenish
tint -

Combines in alloys with
gold silver & lead - &
other metals -

Gold Sol. in aqua Regia.

Silver precipitates gold
from its solution -

Proto salts of iron precip An.
in Me. State.

Gold almost always occurs
native in nature -

found embedded in Quartz
& also in grains in sand -

Mercury used to separate gold
from its ores -

Extraction of gold by lead -

Small assays on the following
plan by J. S. Hunt -

Pearl ash }
Oxide of lead } form flux
& quartz rock } with gold grains -

by the addition of Carbon or
Charcoal - lead is liberated
which settles upon the
gold & forms an alloy

this alloy is refined by ax i.
the lead -

Platinum & a few other
very rare metals
which are always ~~used~~
combined with it -

Platinum infusible in
ordinary furnaces -

acted upon by aqua regia
but not so readily as
Gold -

Can be dissolved & precip
in the form of spongy
metal.

Organic Chemistry

Carbon, Hydrogen Nitrogen &
oxygen - The 4 elements -

Carbon always present -
Nitrogen often absent -

(see Yoman & Fownes)

Sugar $C_{12} H_{22} O_{11}$

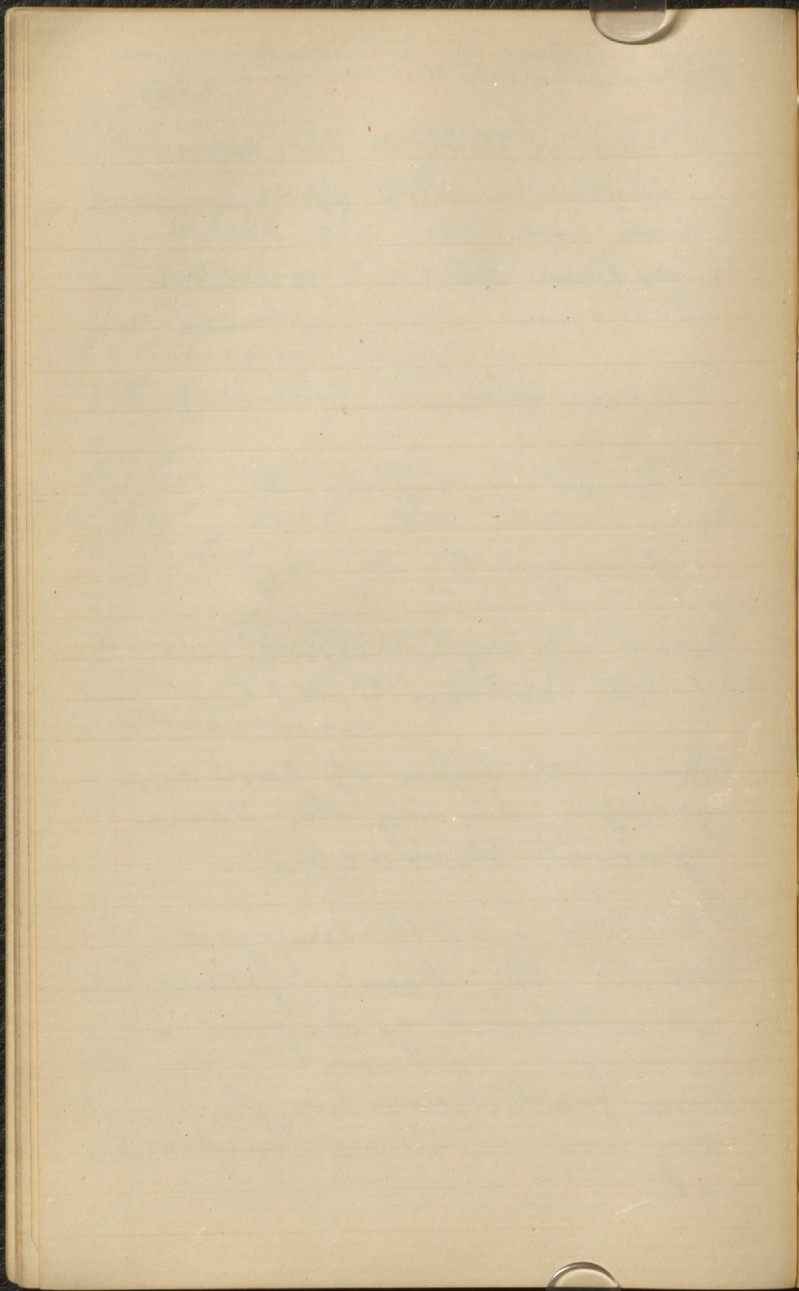
Vinigar $C_4 H_4 O_4$

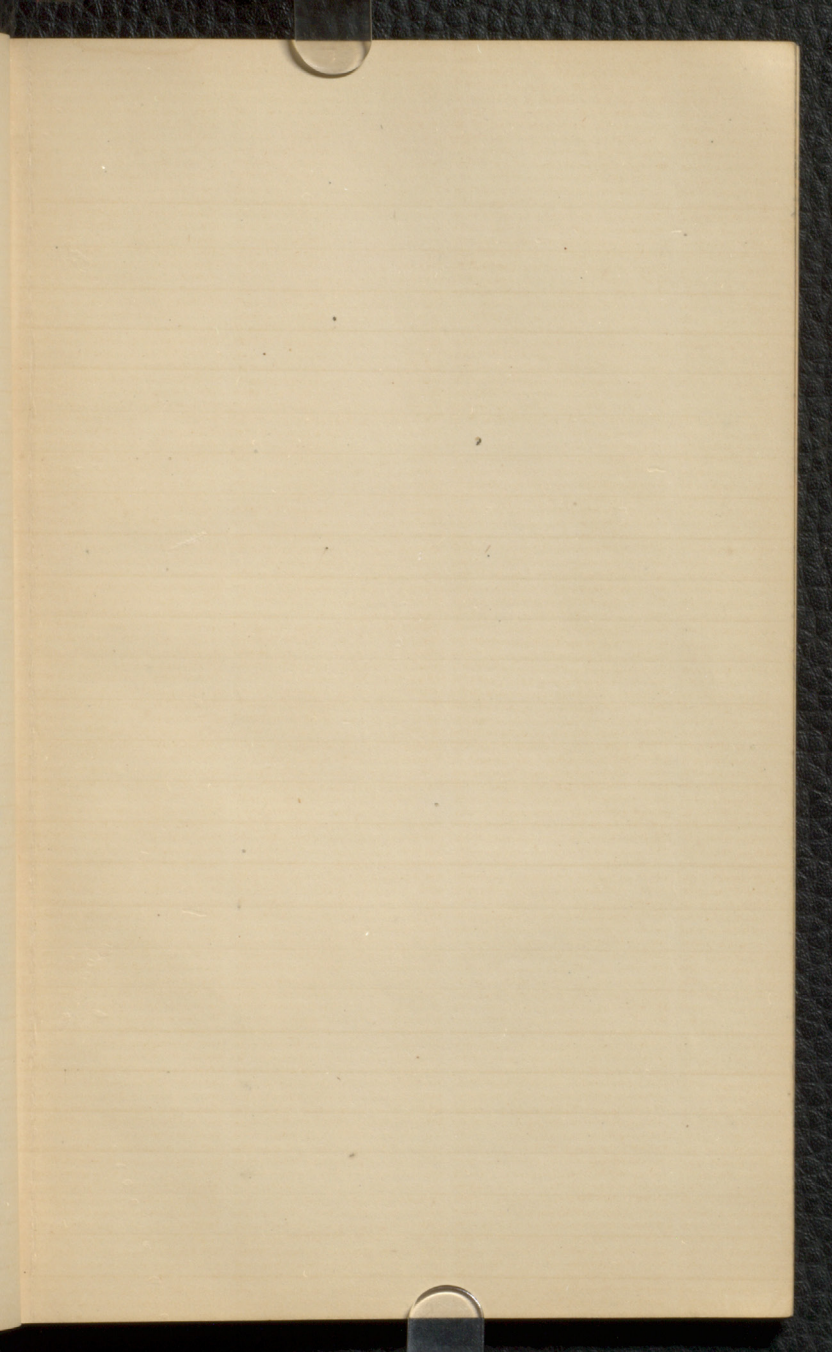
Sugar, Starch & Woody fibre -
all contain C. H. O.
12 10 10

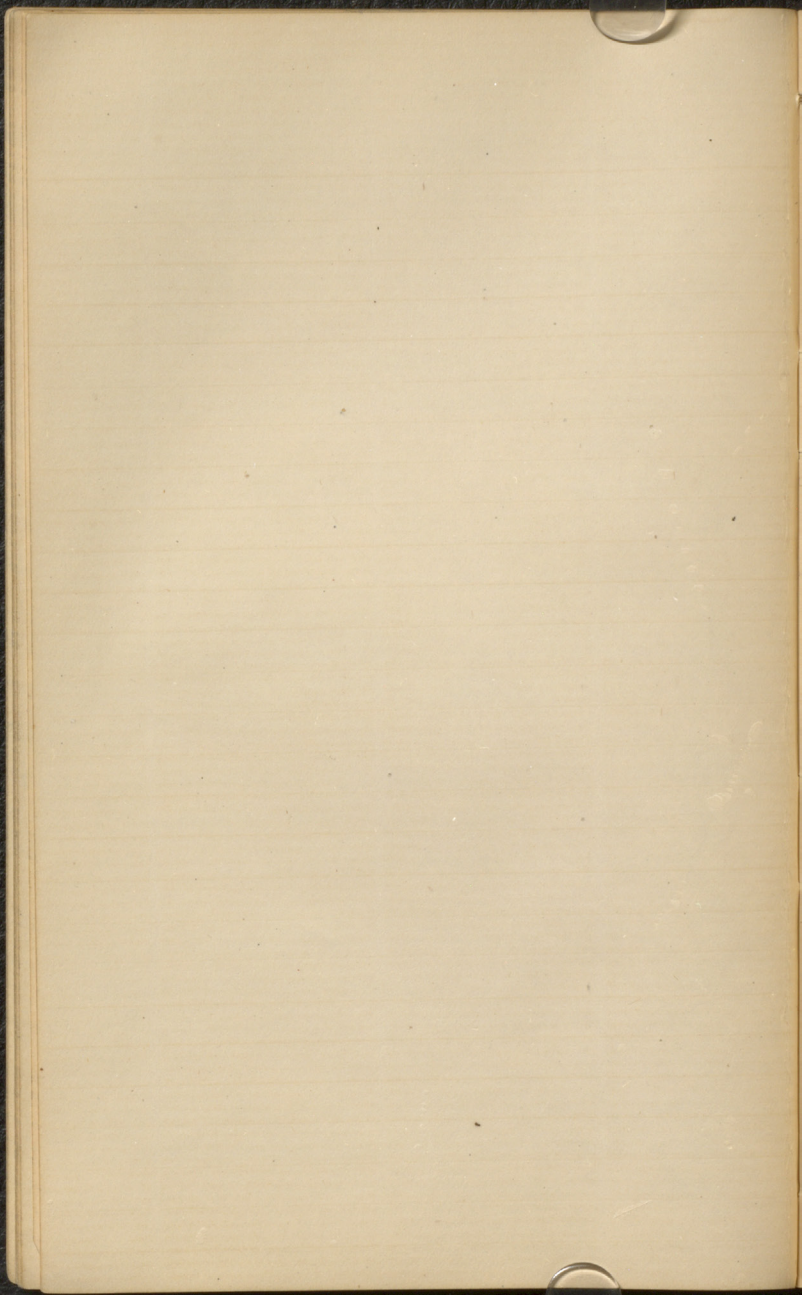
These are types of certain
groups, having the same
general characters -

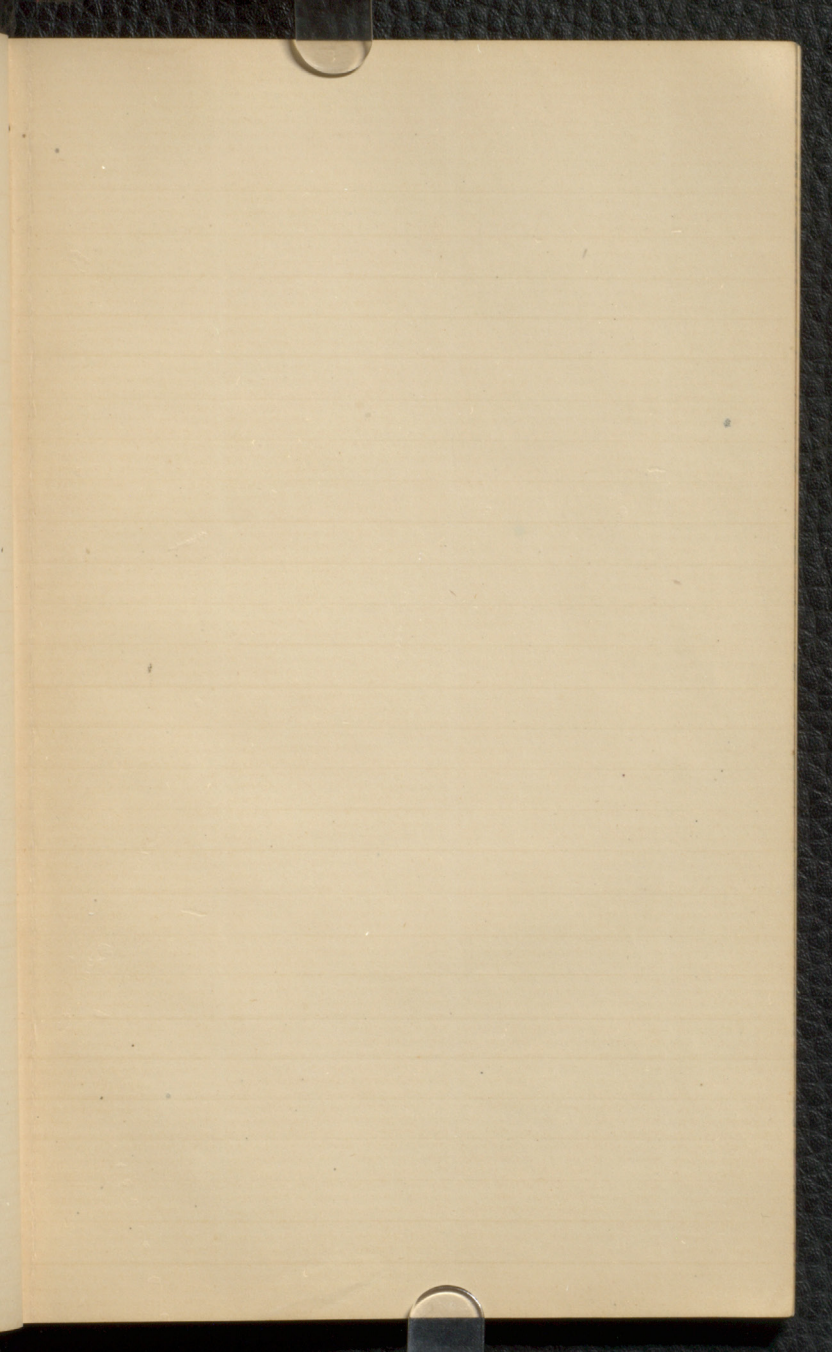
There are 8 or 10 sugars
having the same formulae
as ordinary sugar -

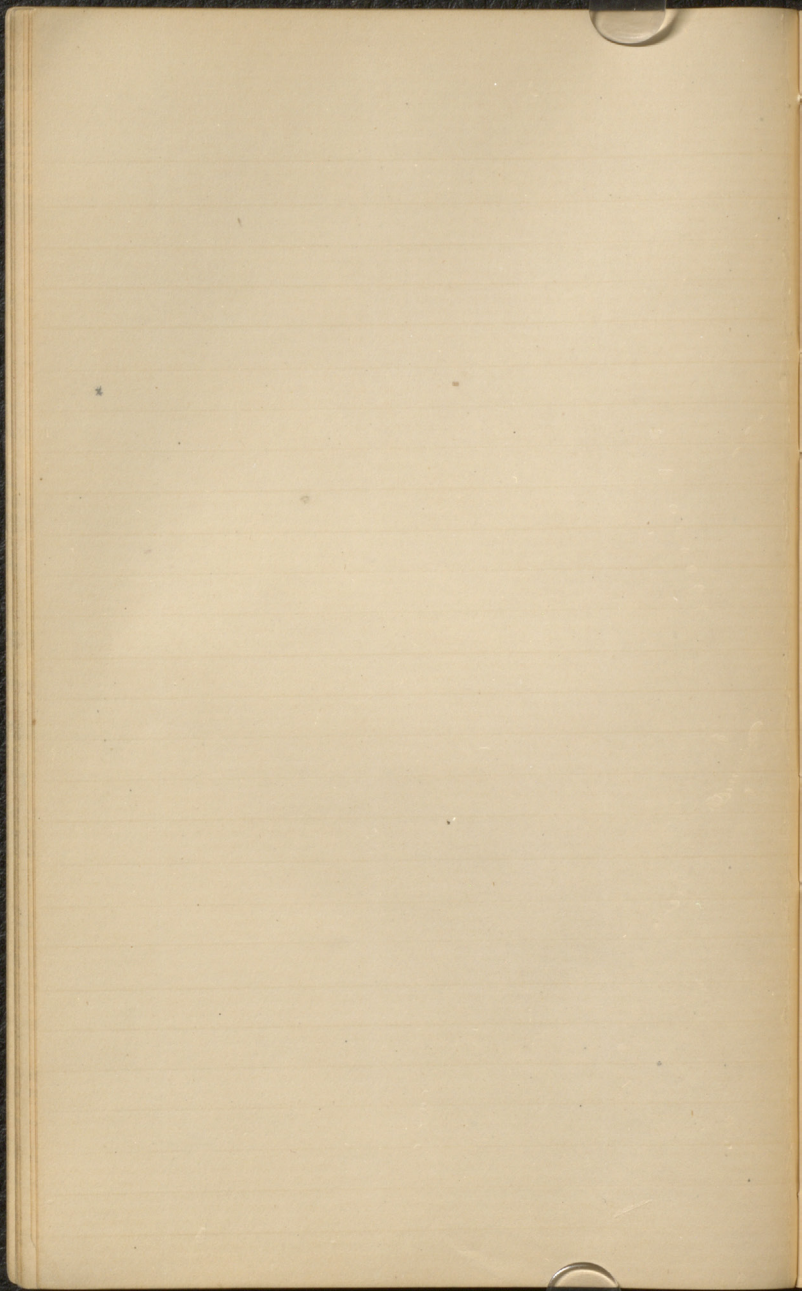
Some fruits have two distinct
sugars in their composition

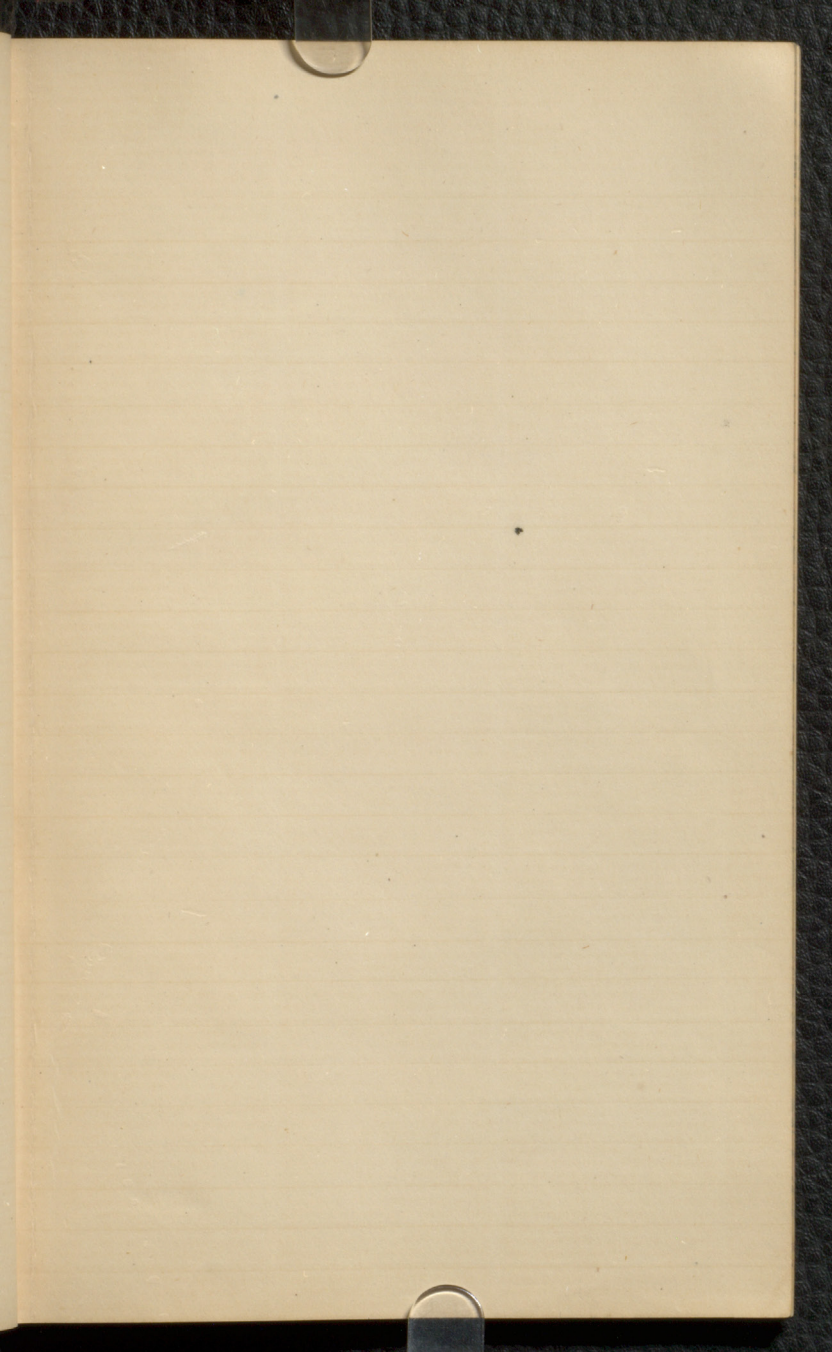


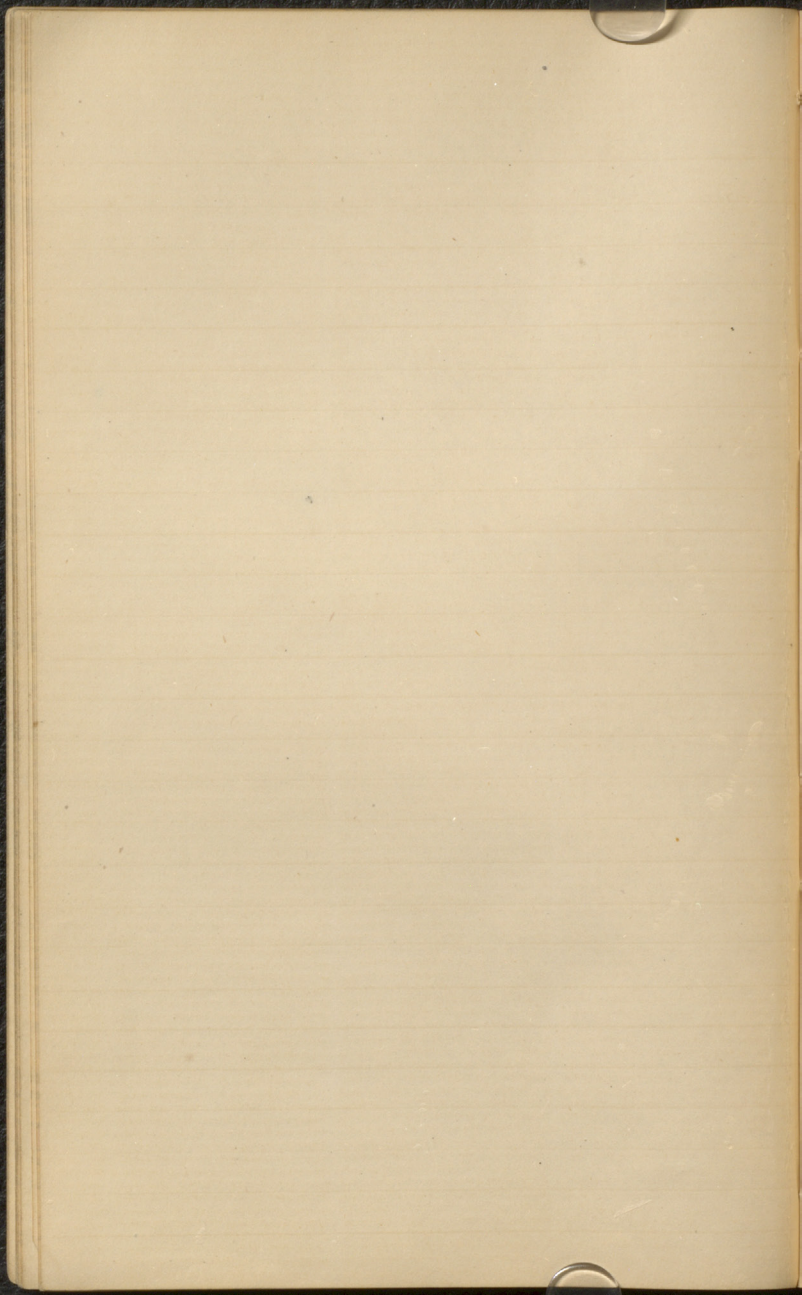


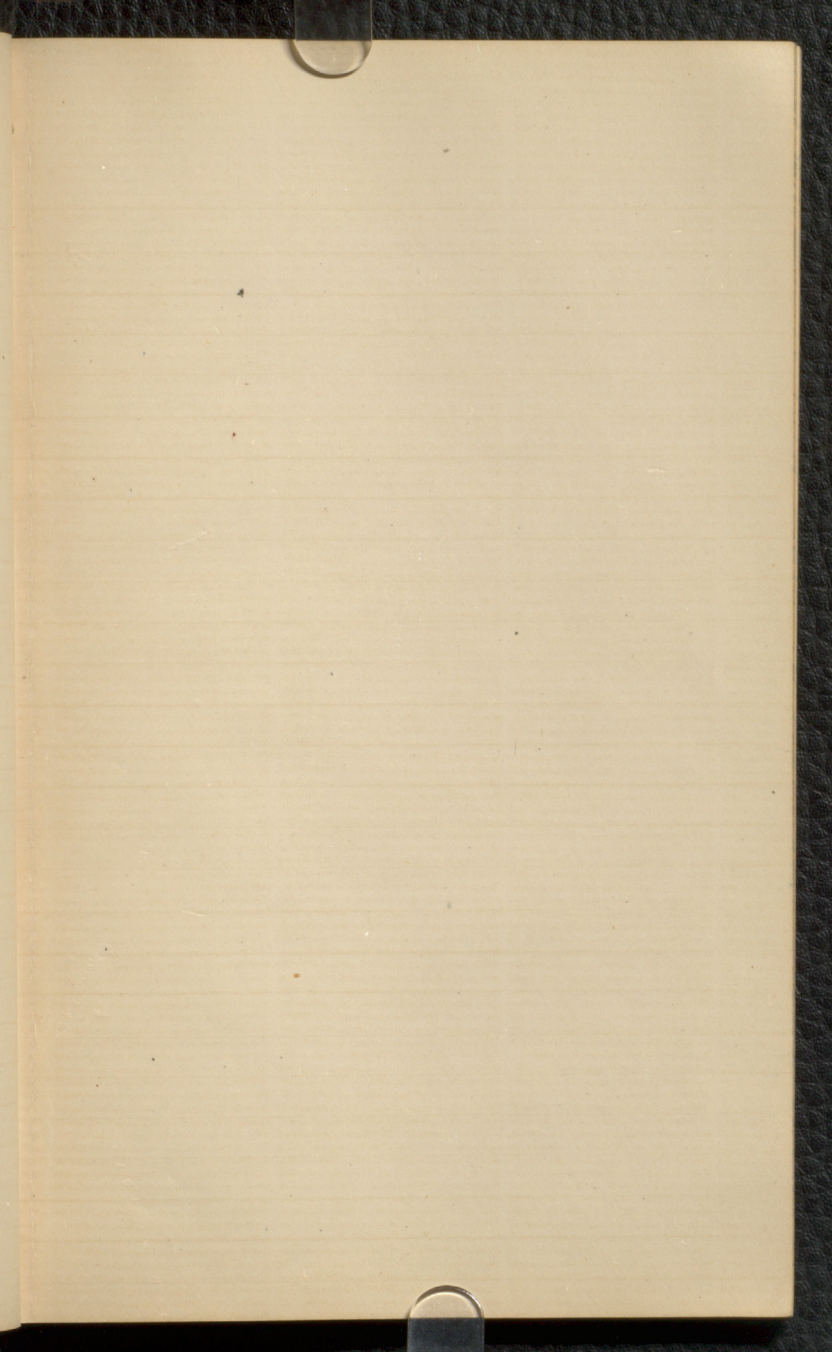


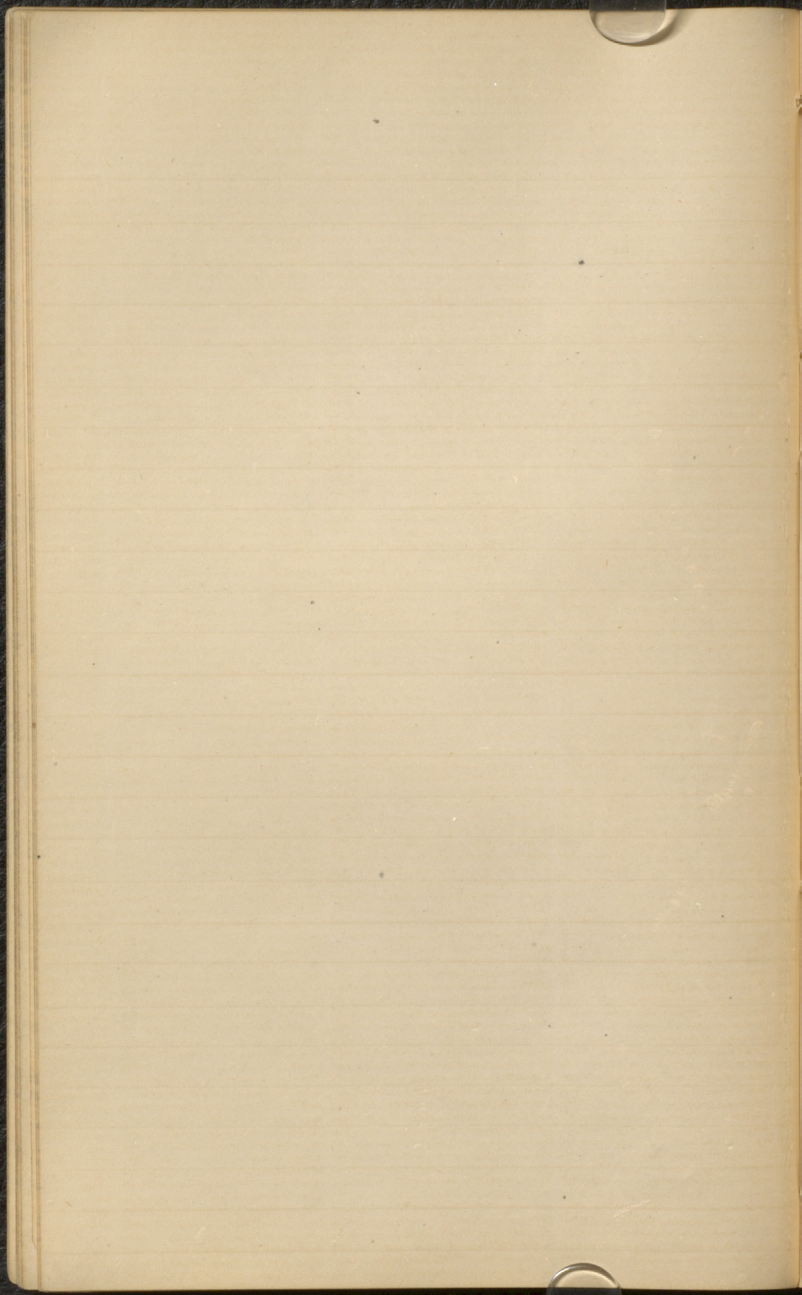


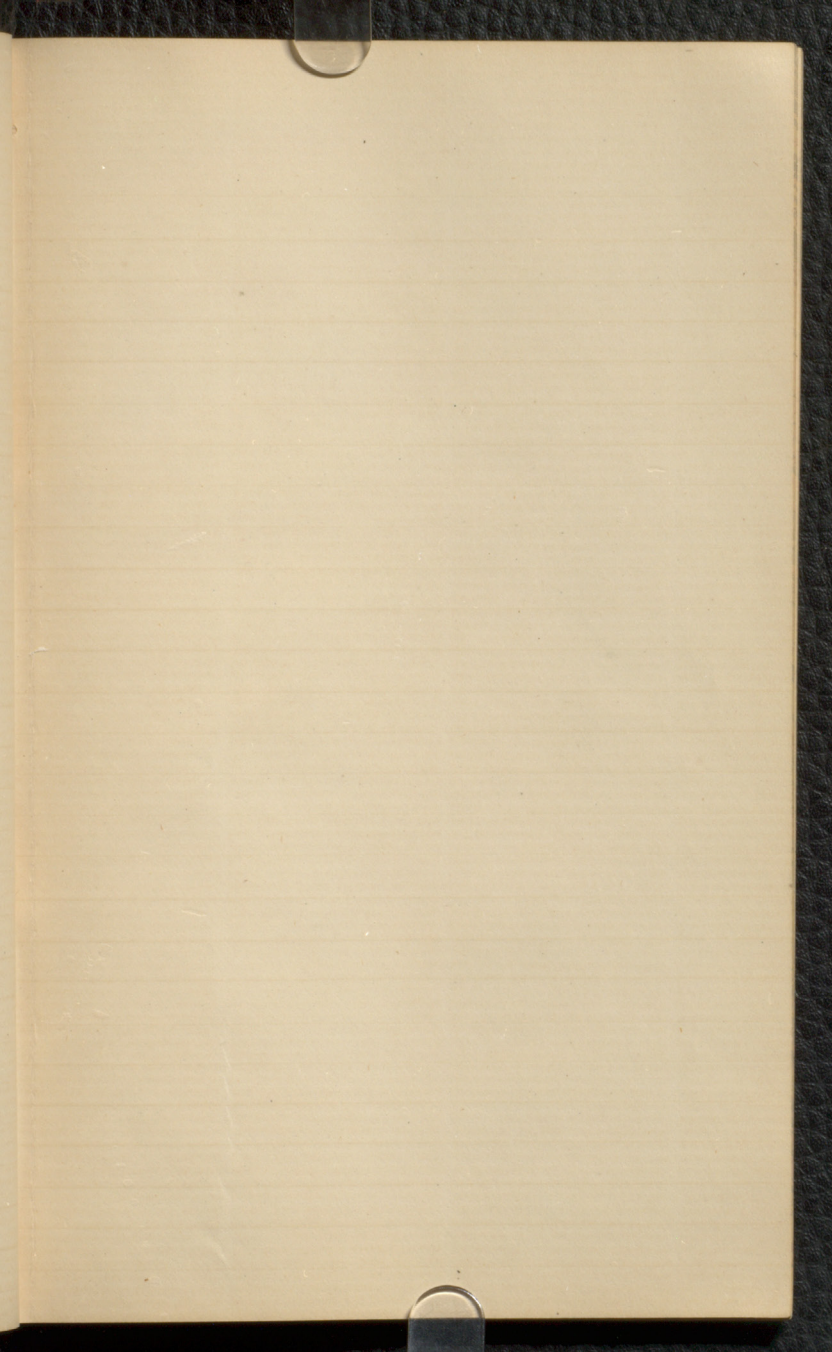


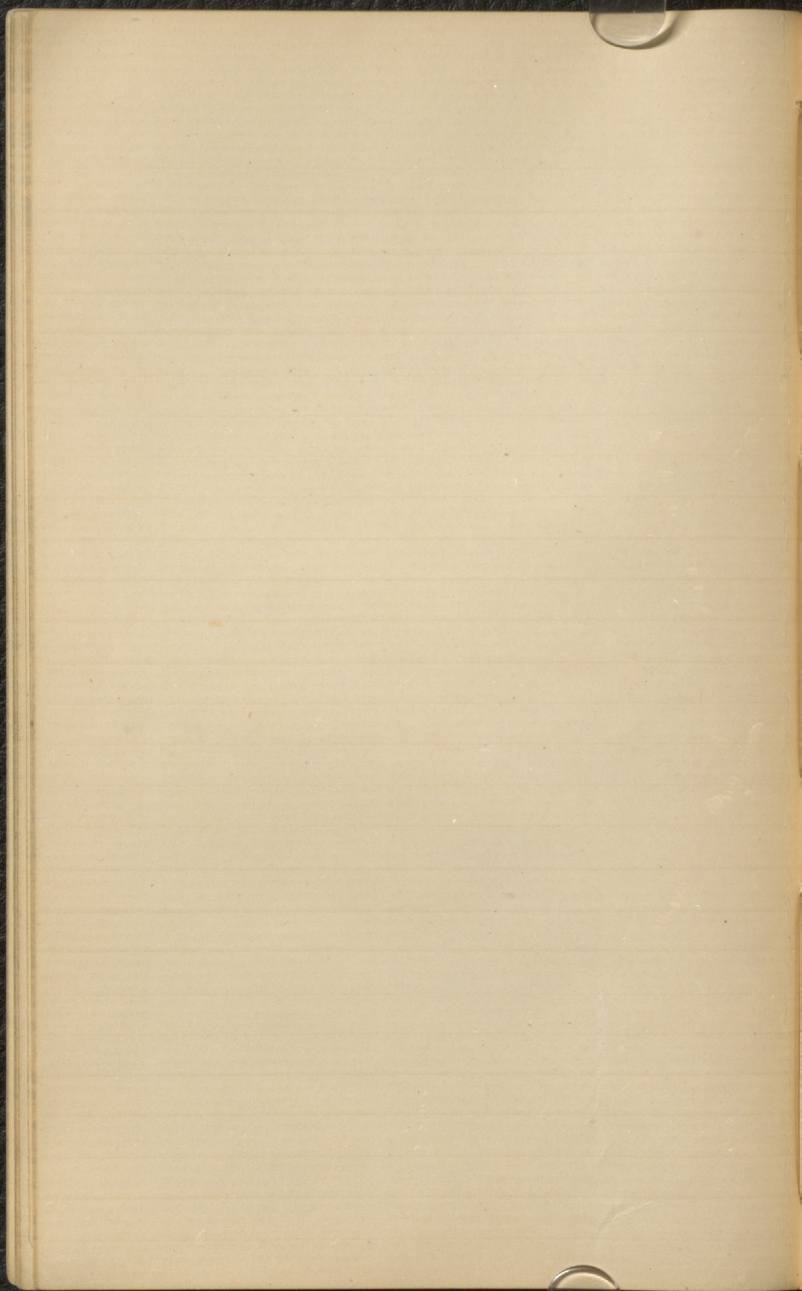


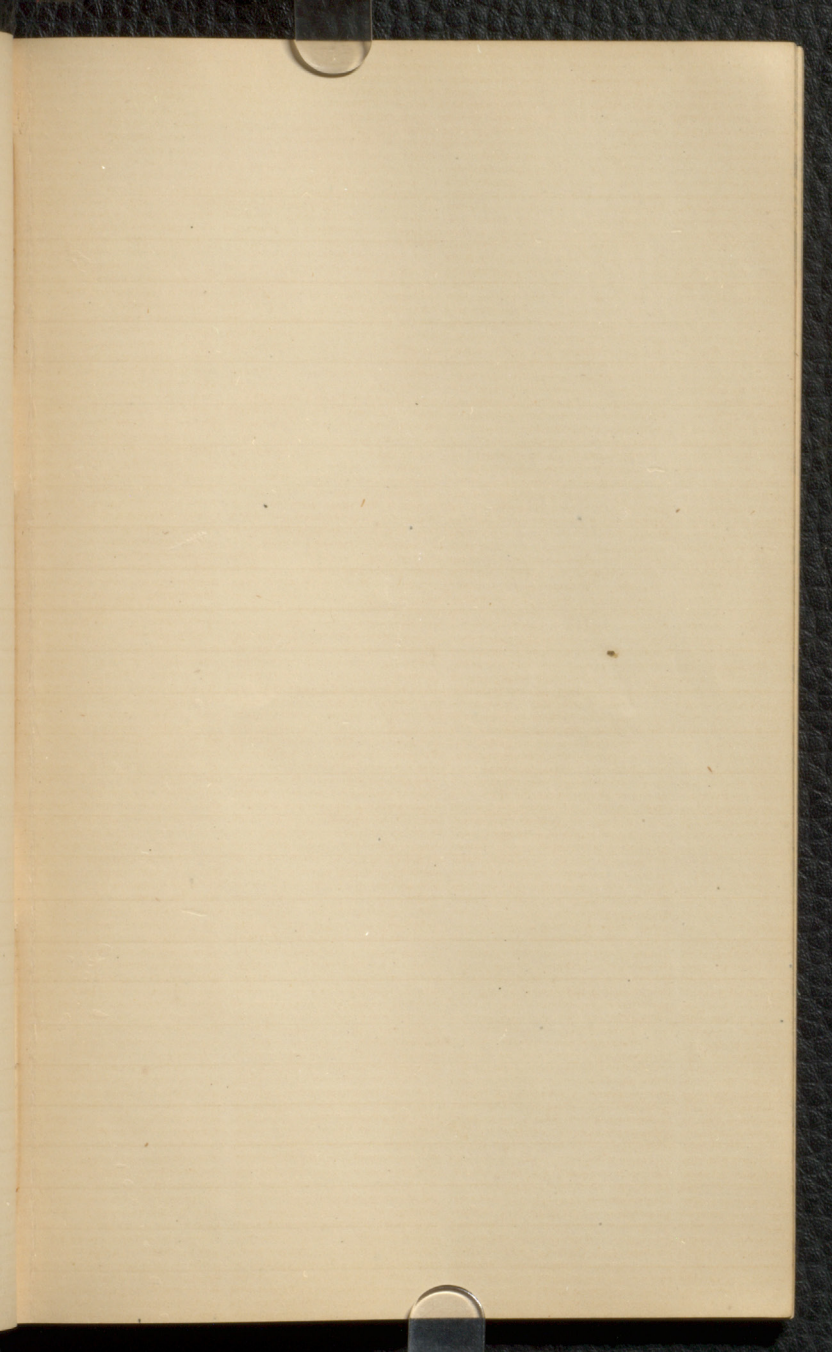


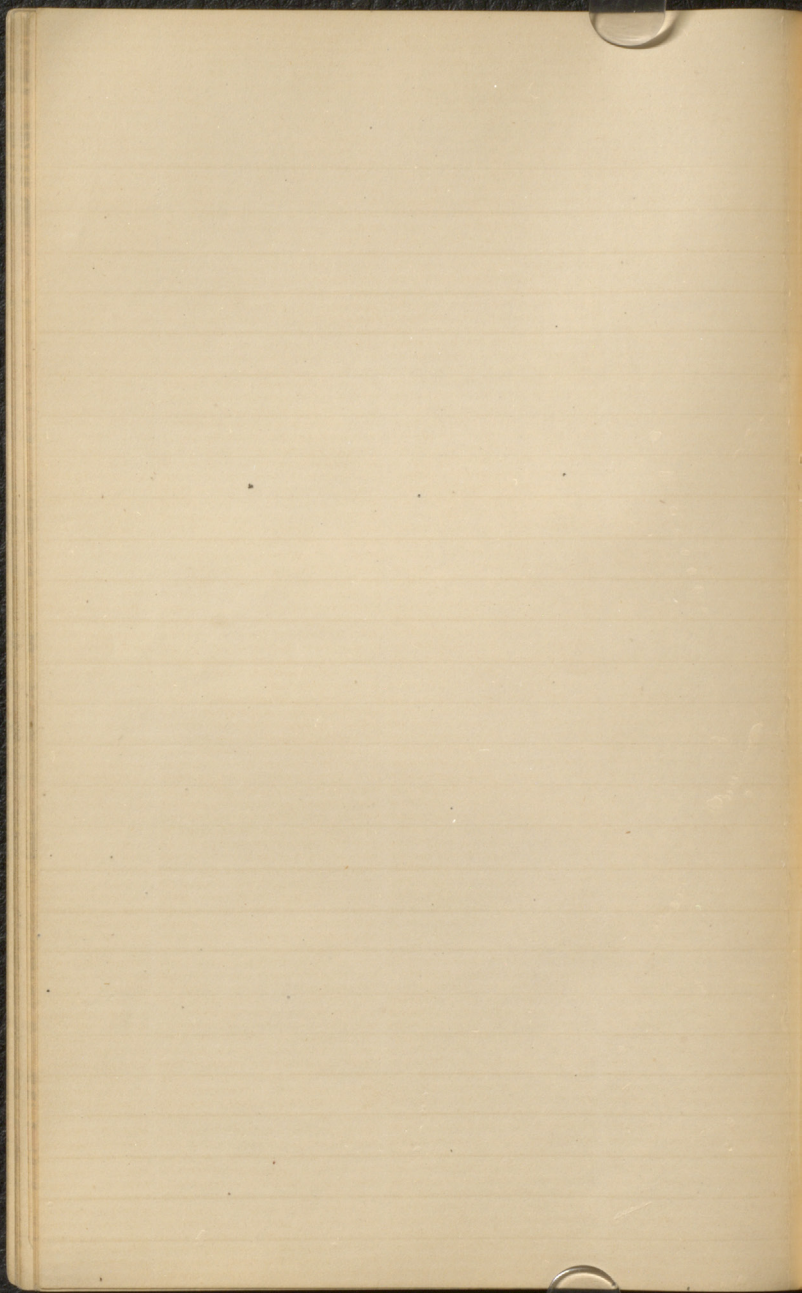


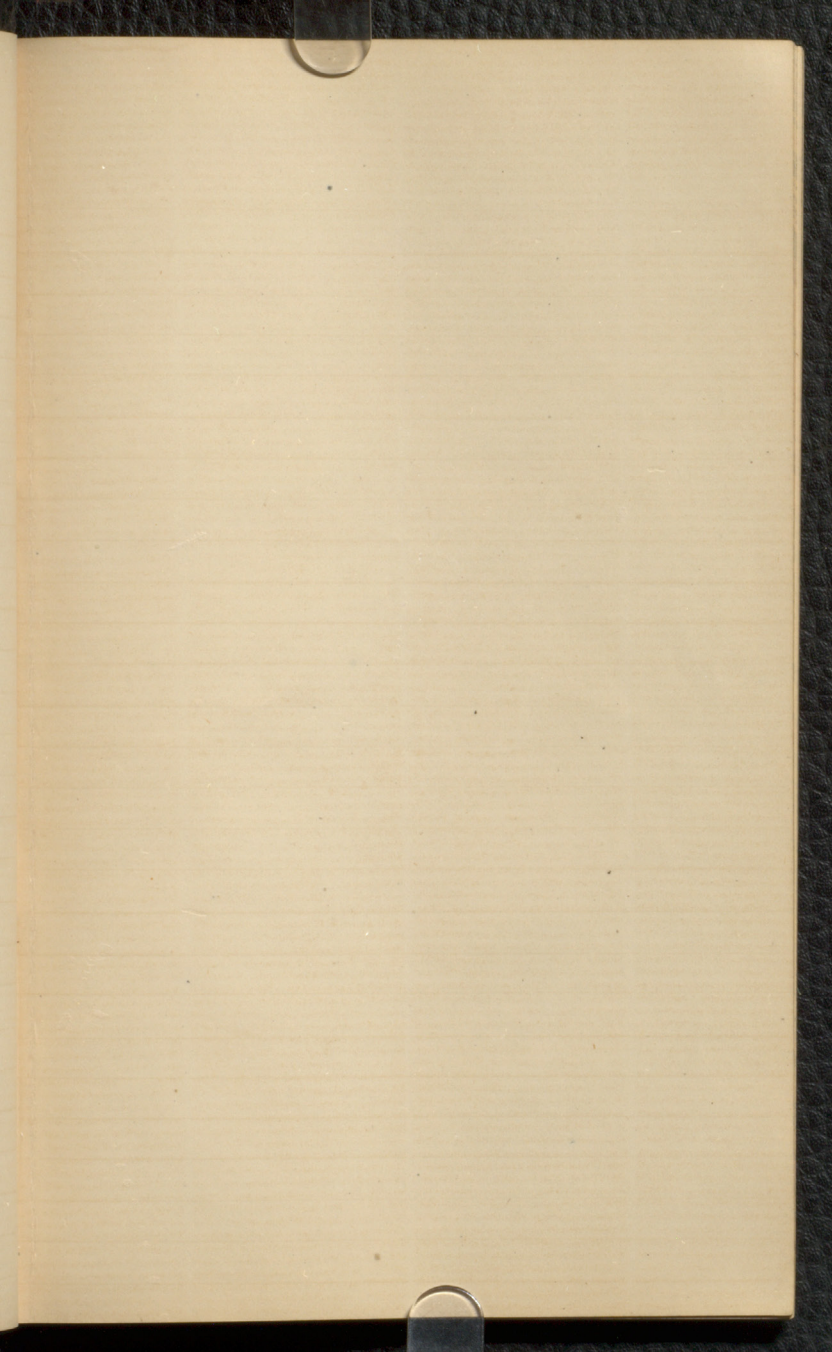


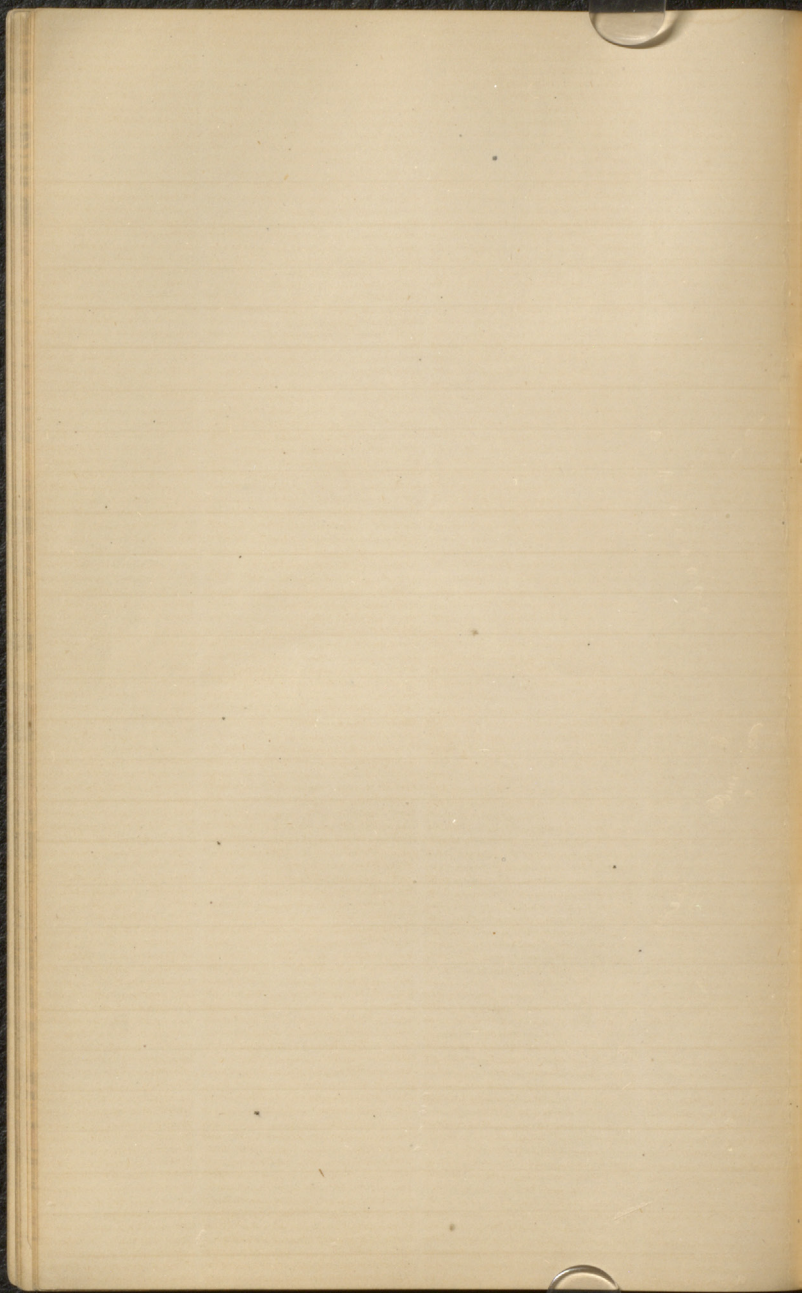


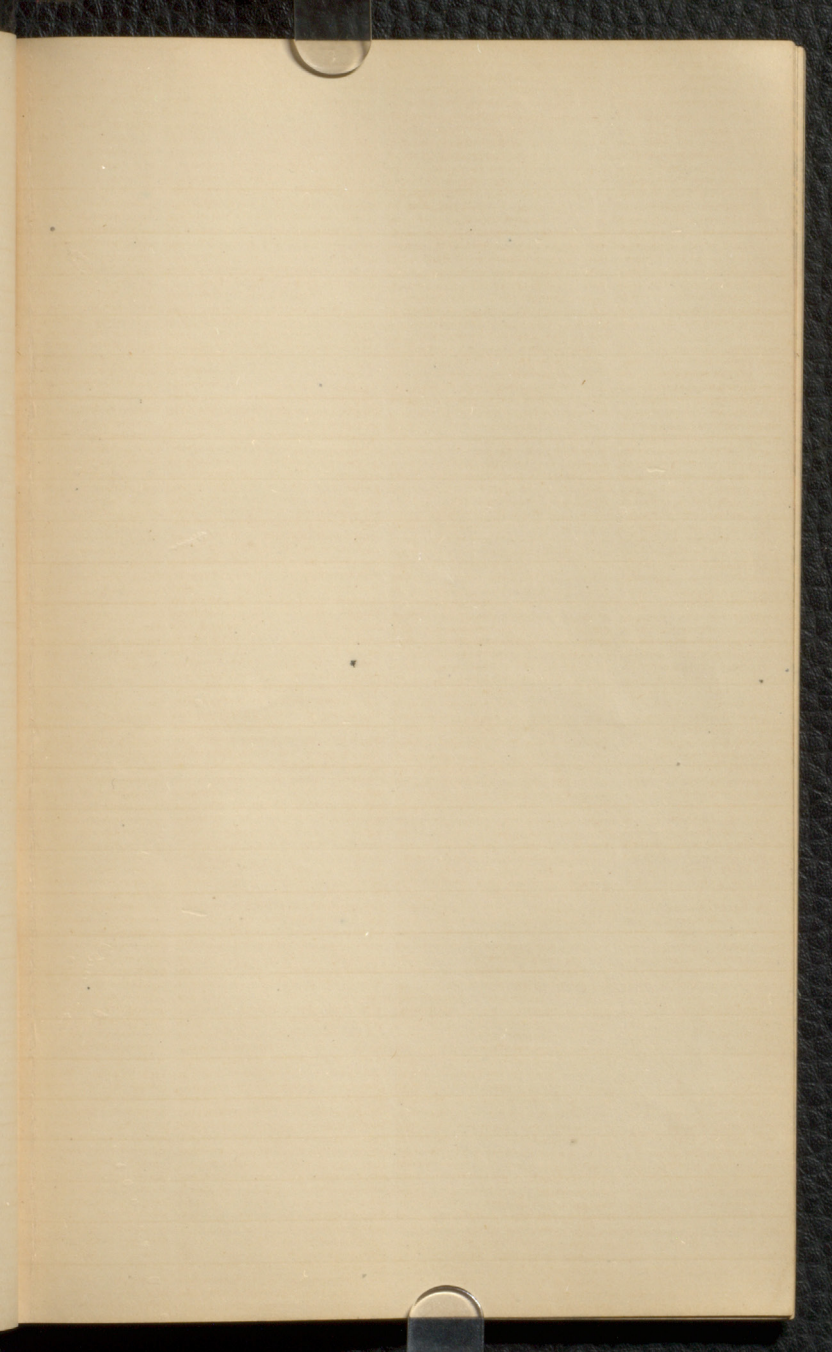


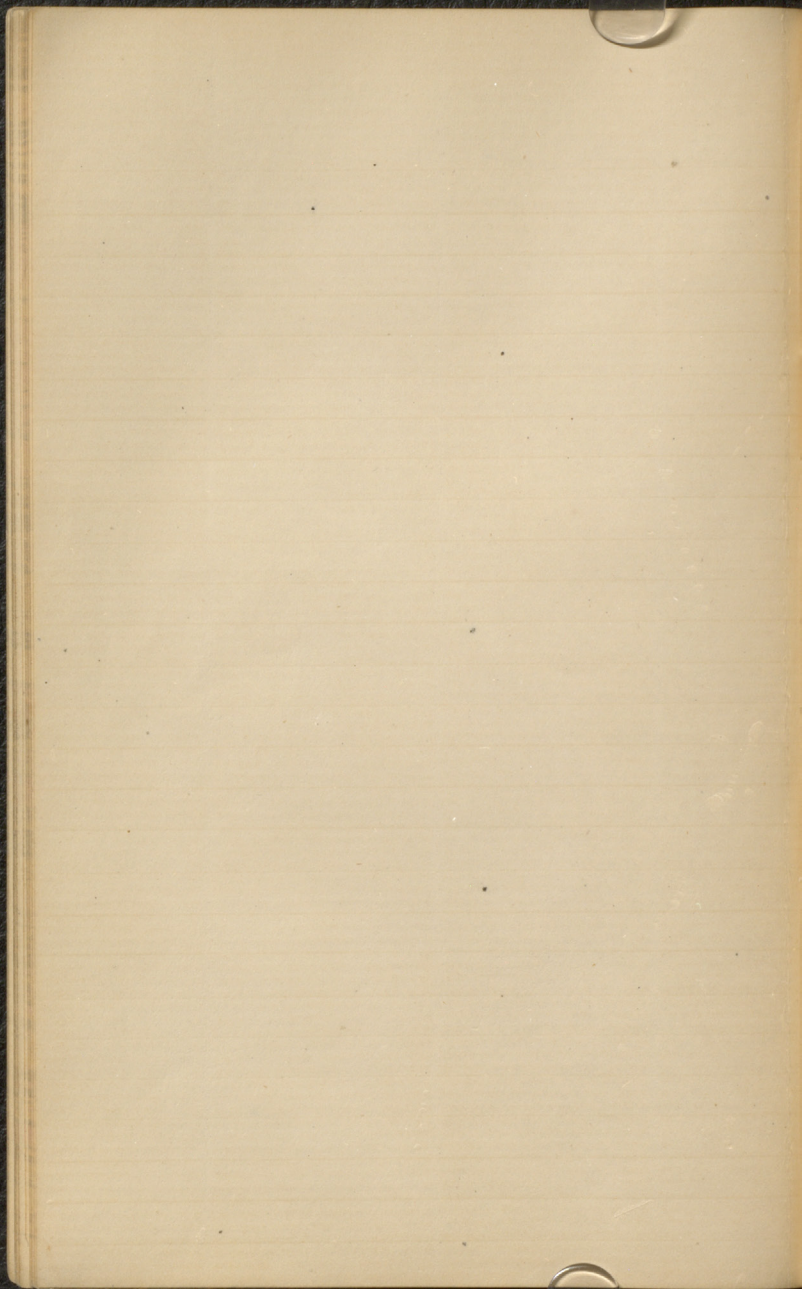


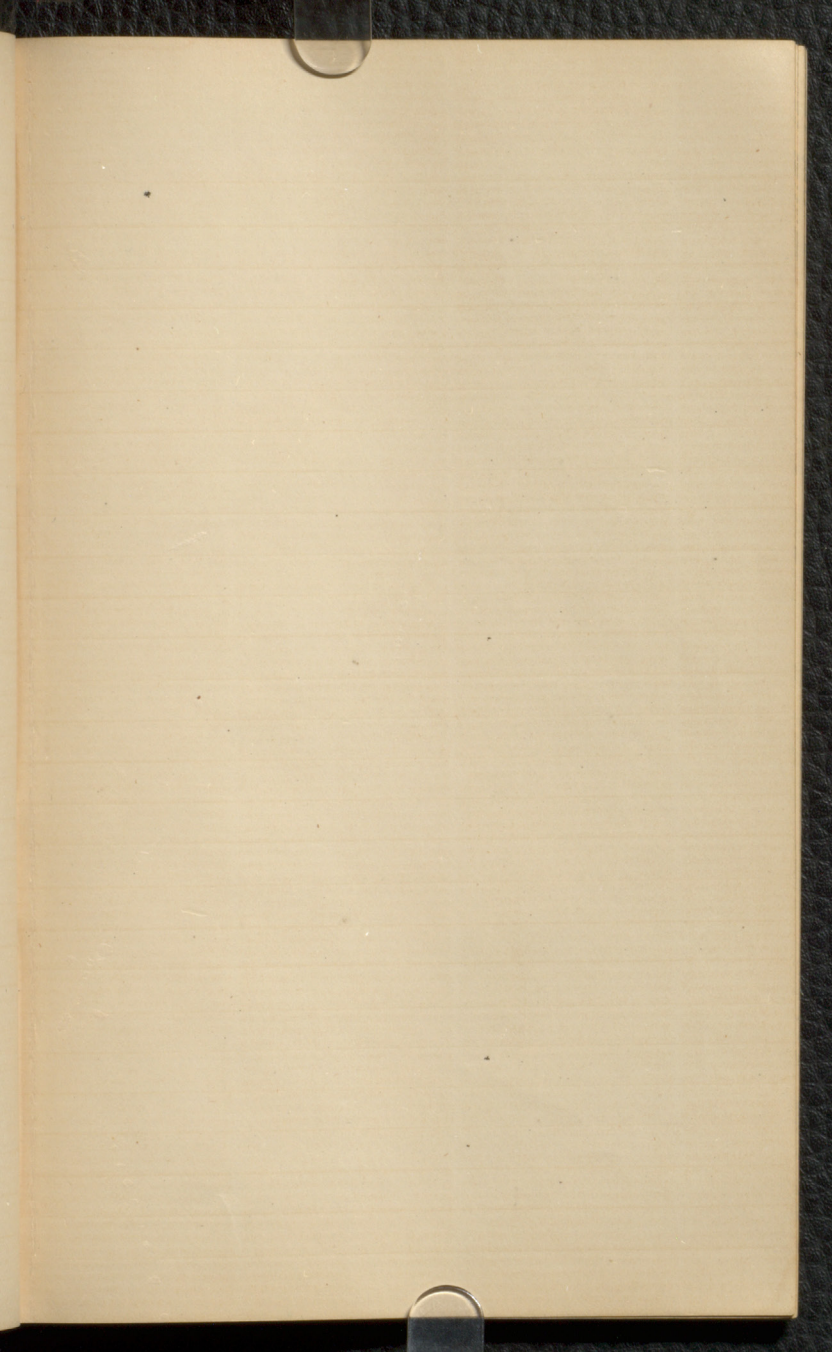


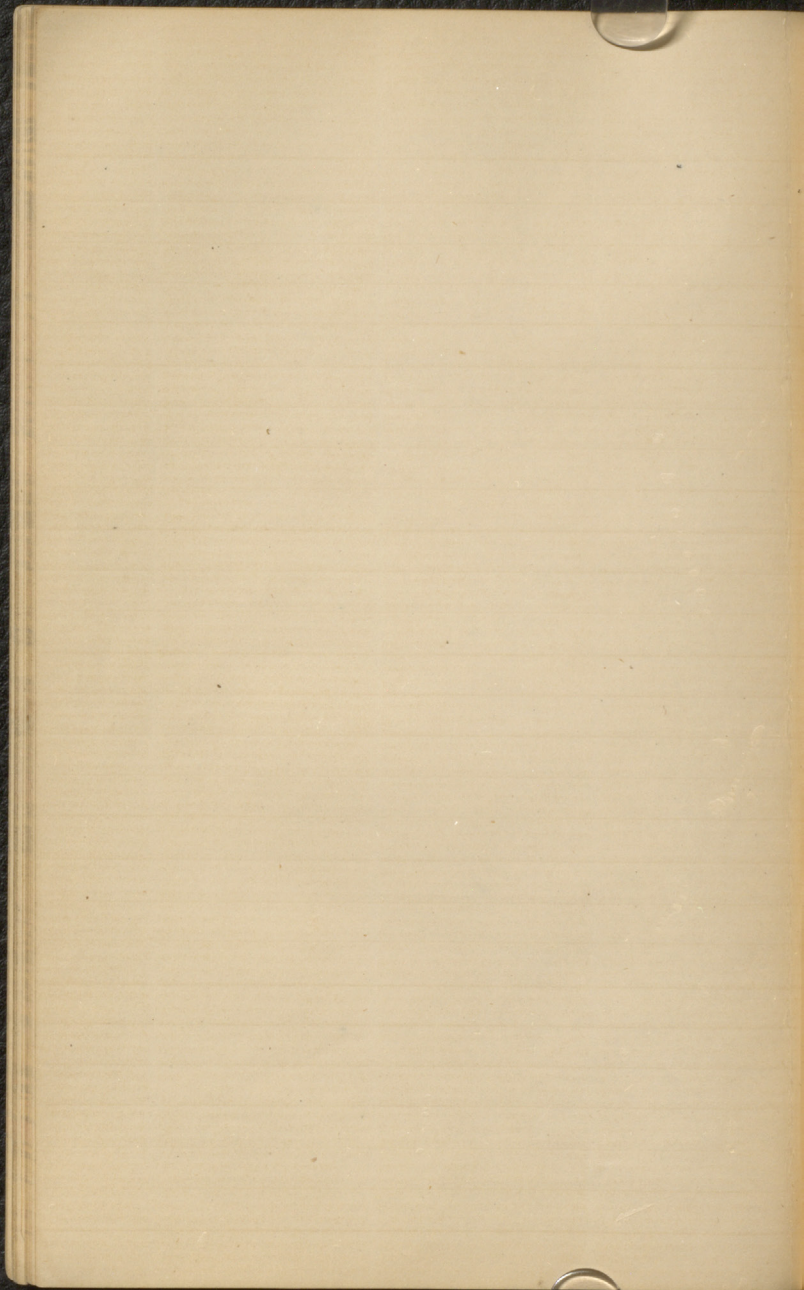


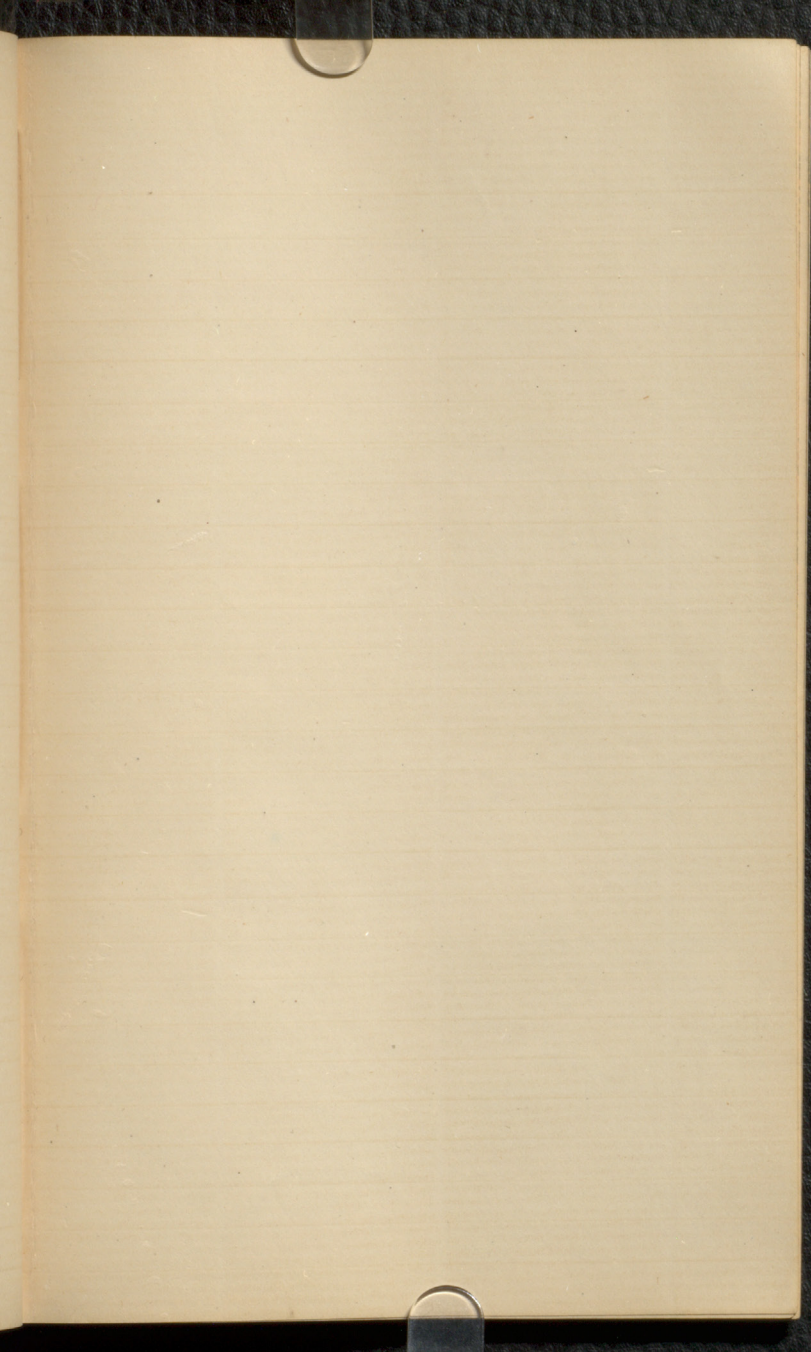


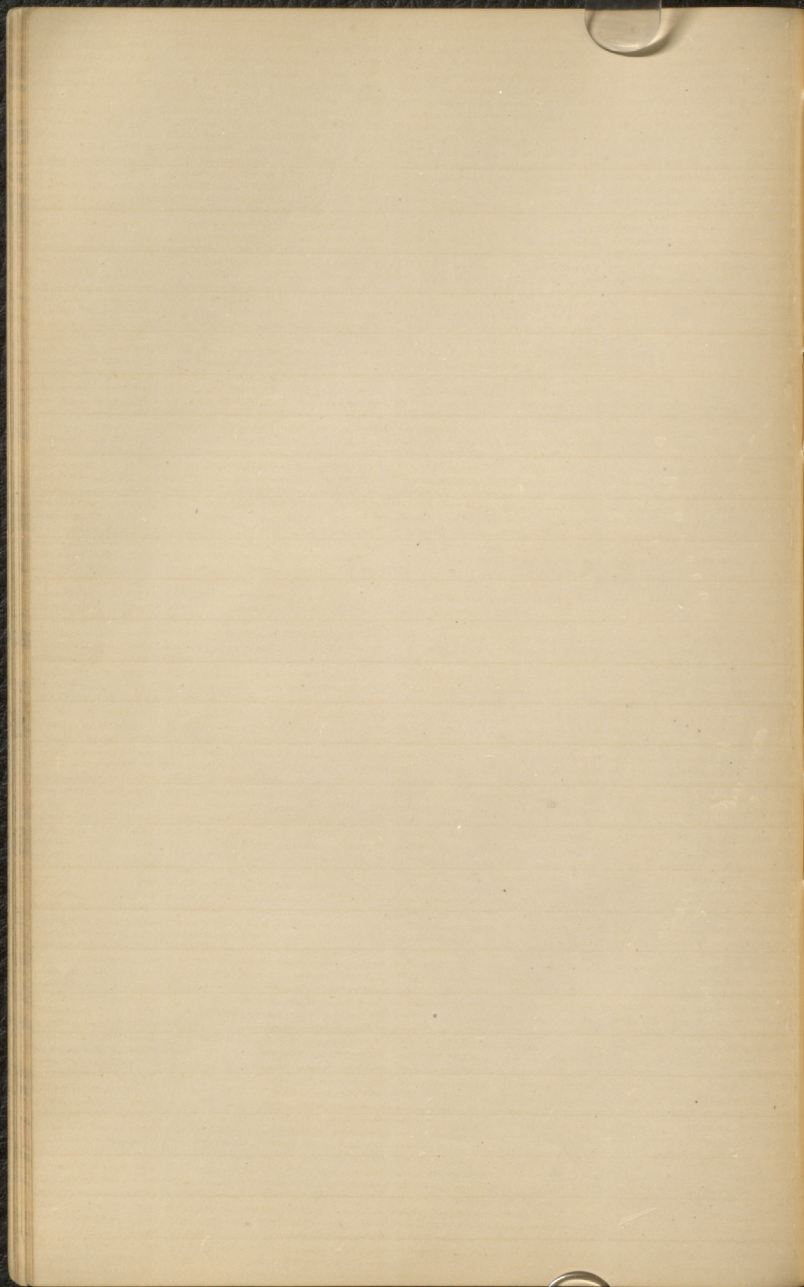


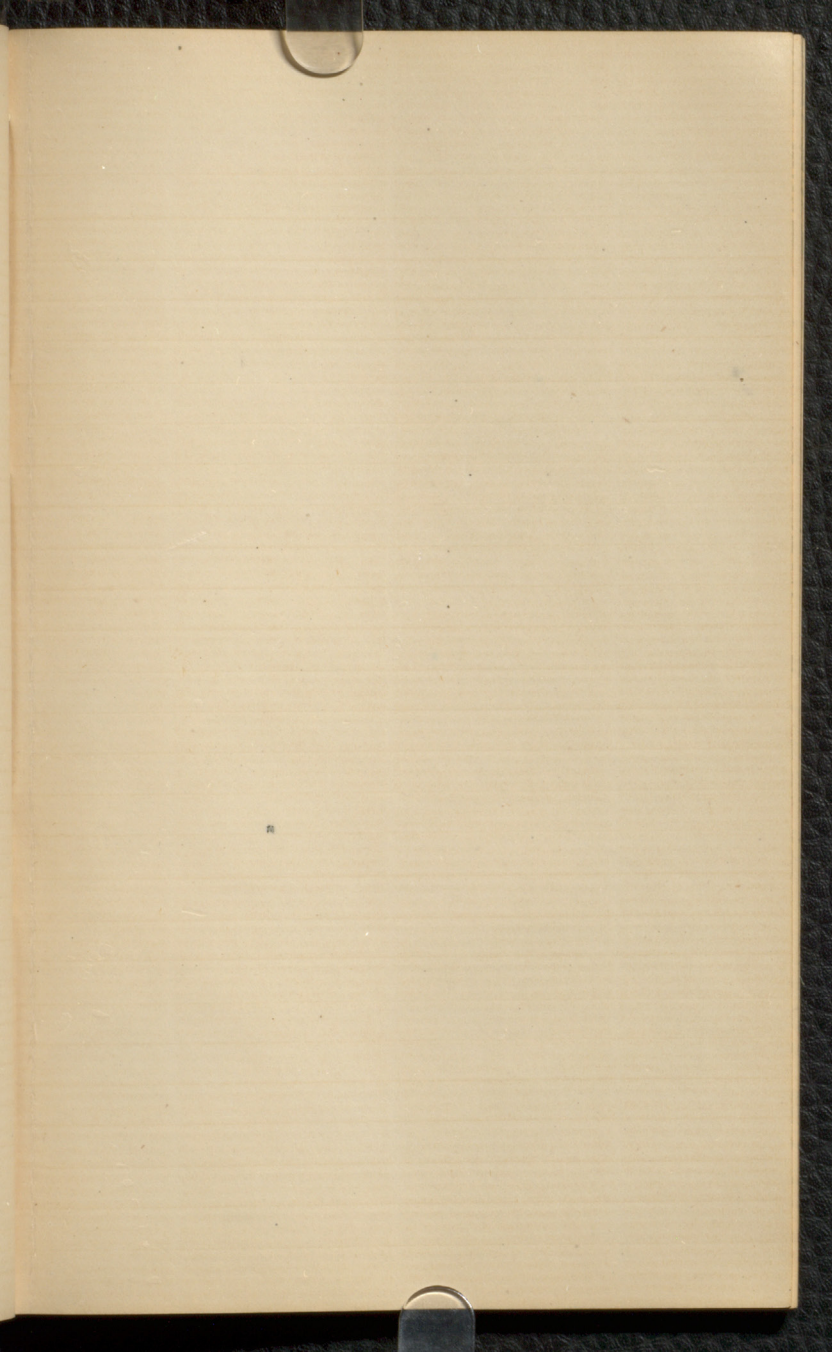


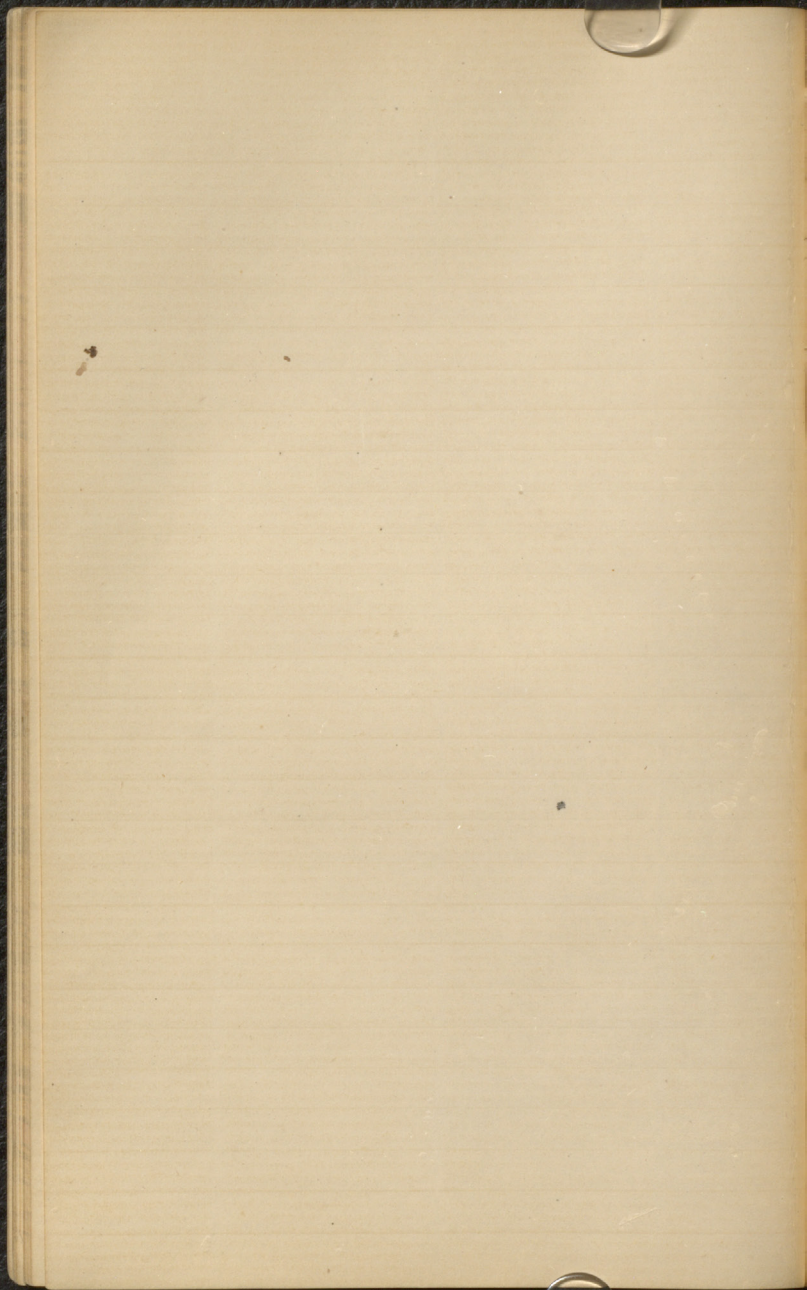


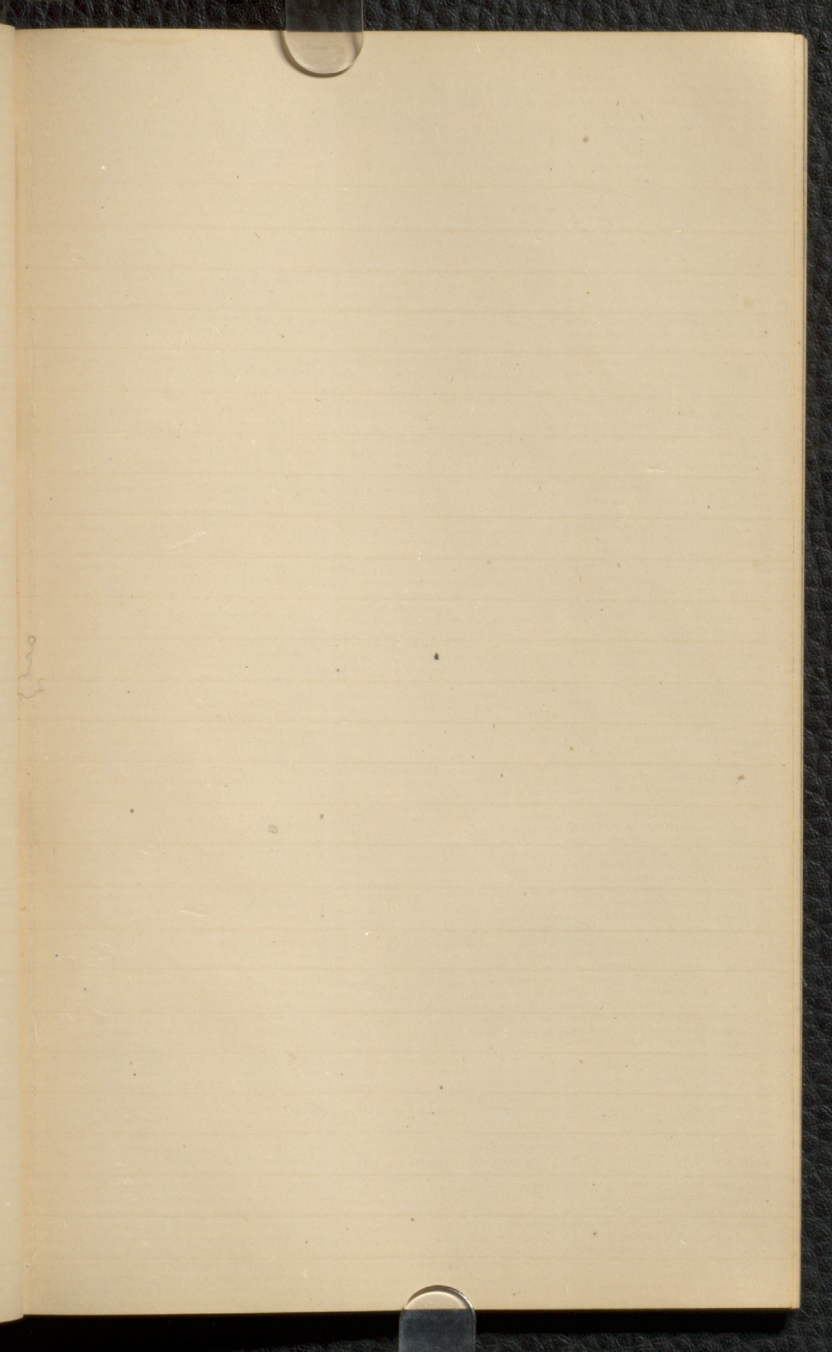


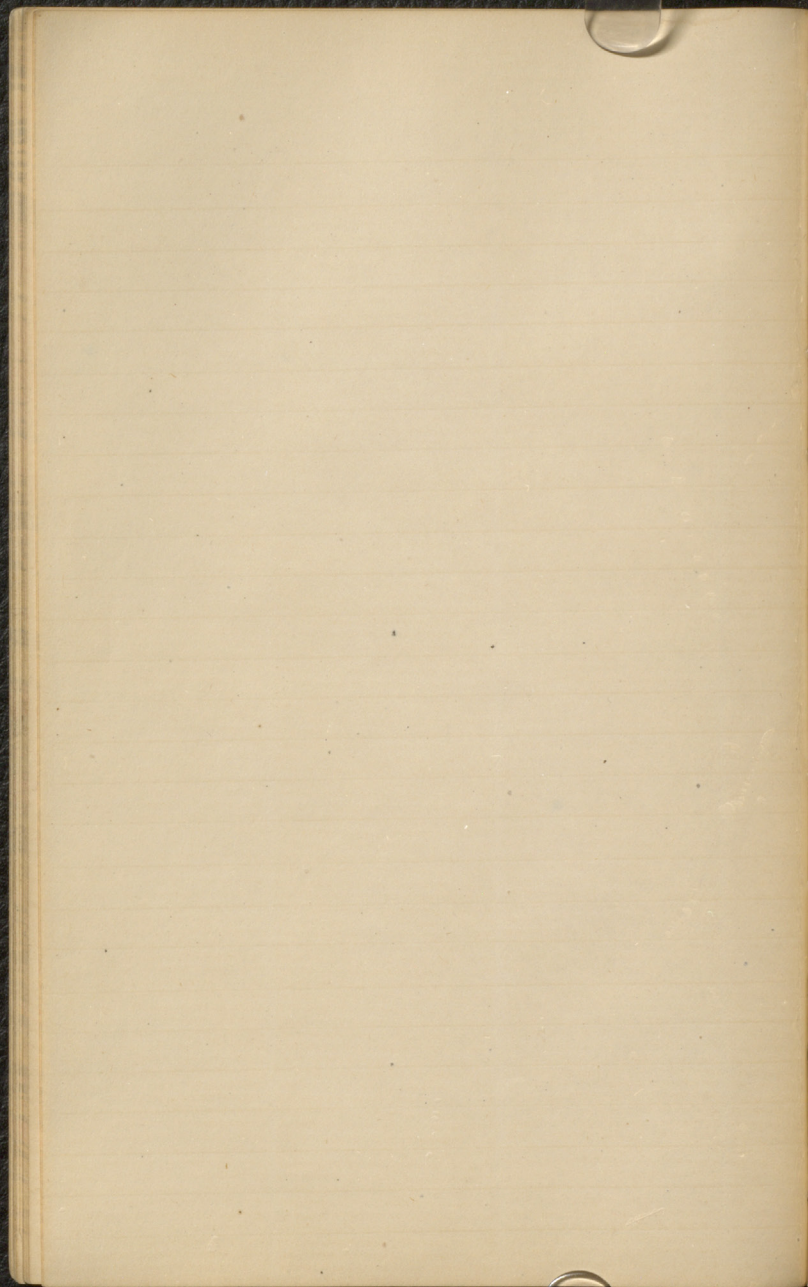


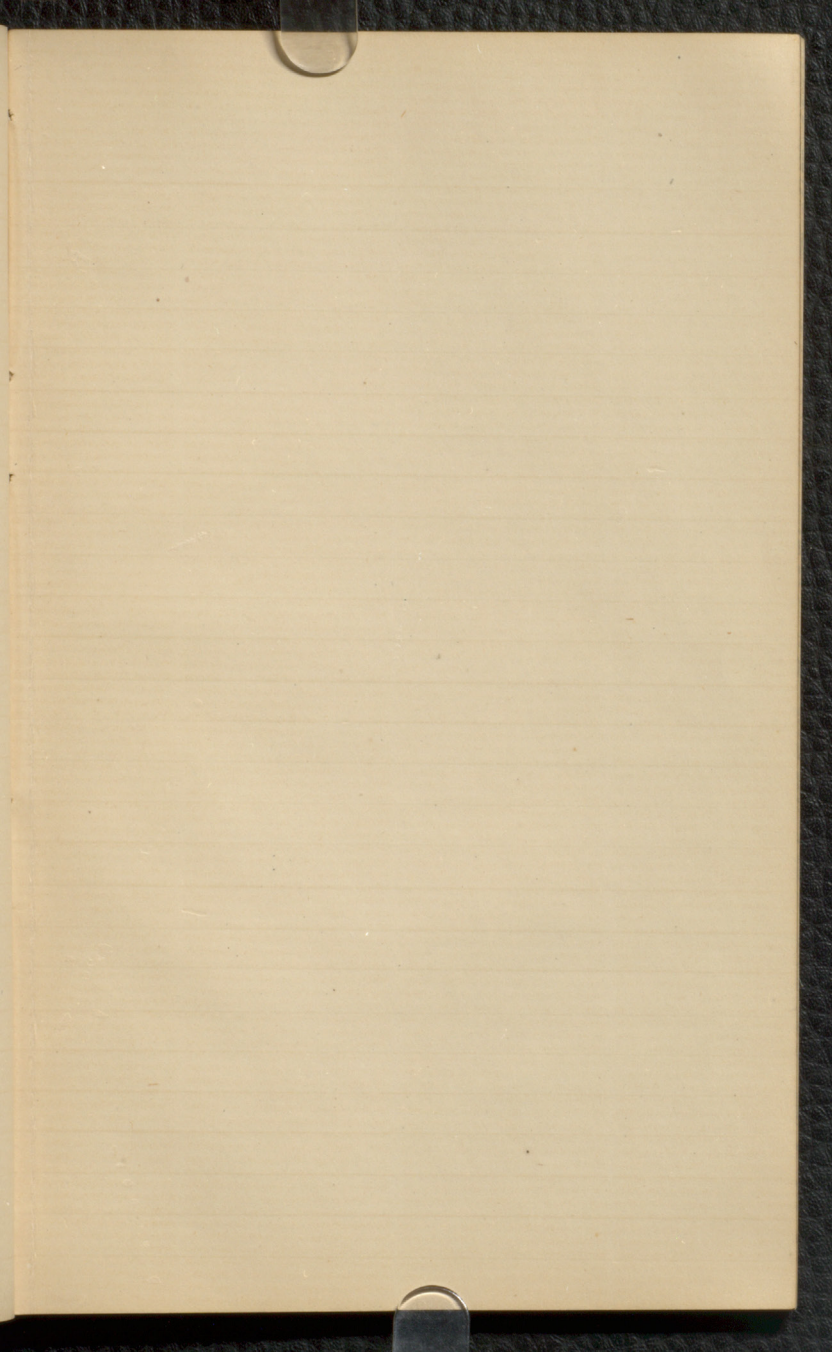


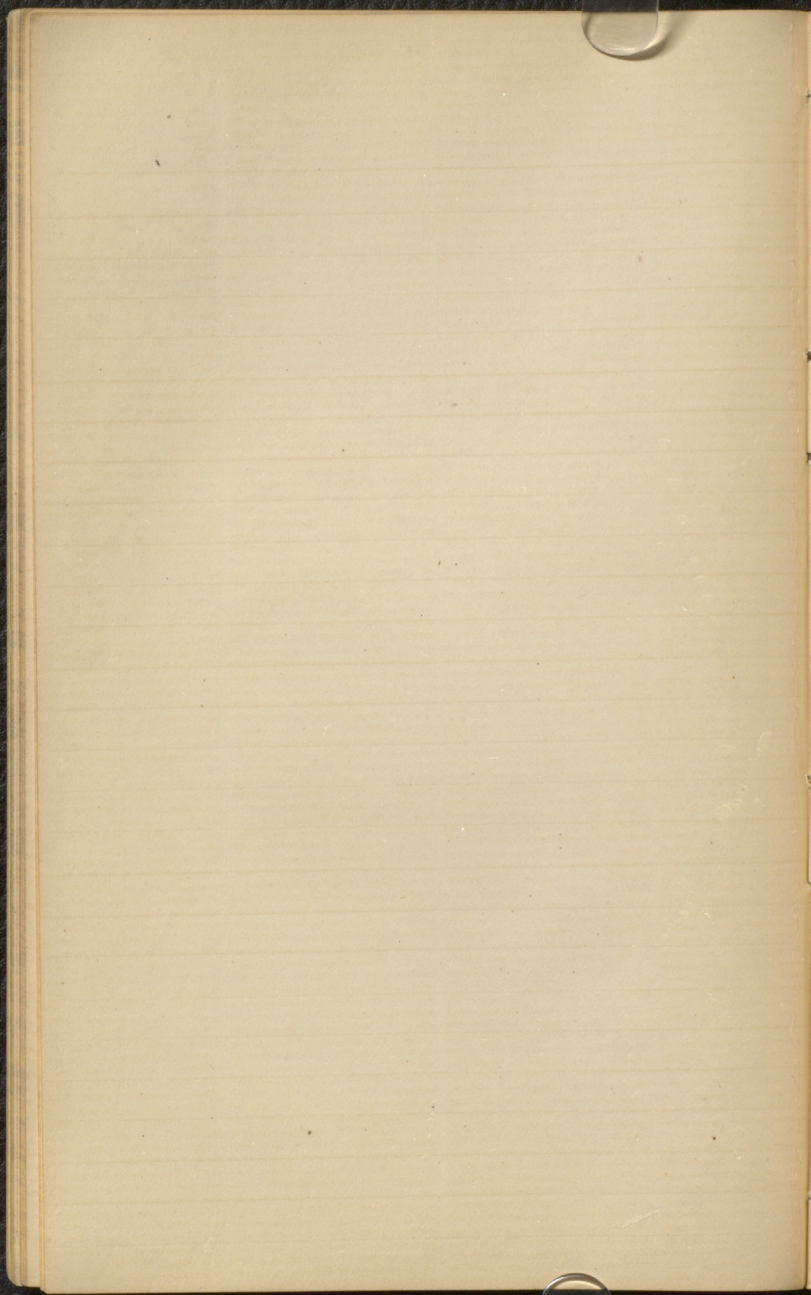


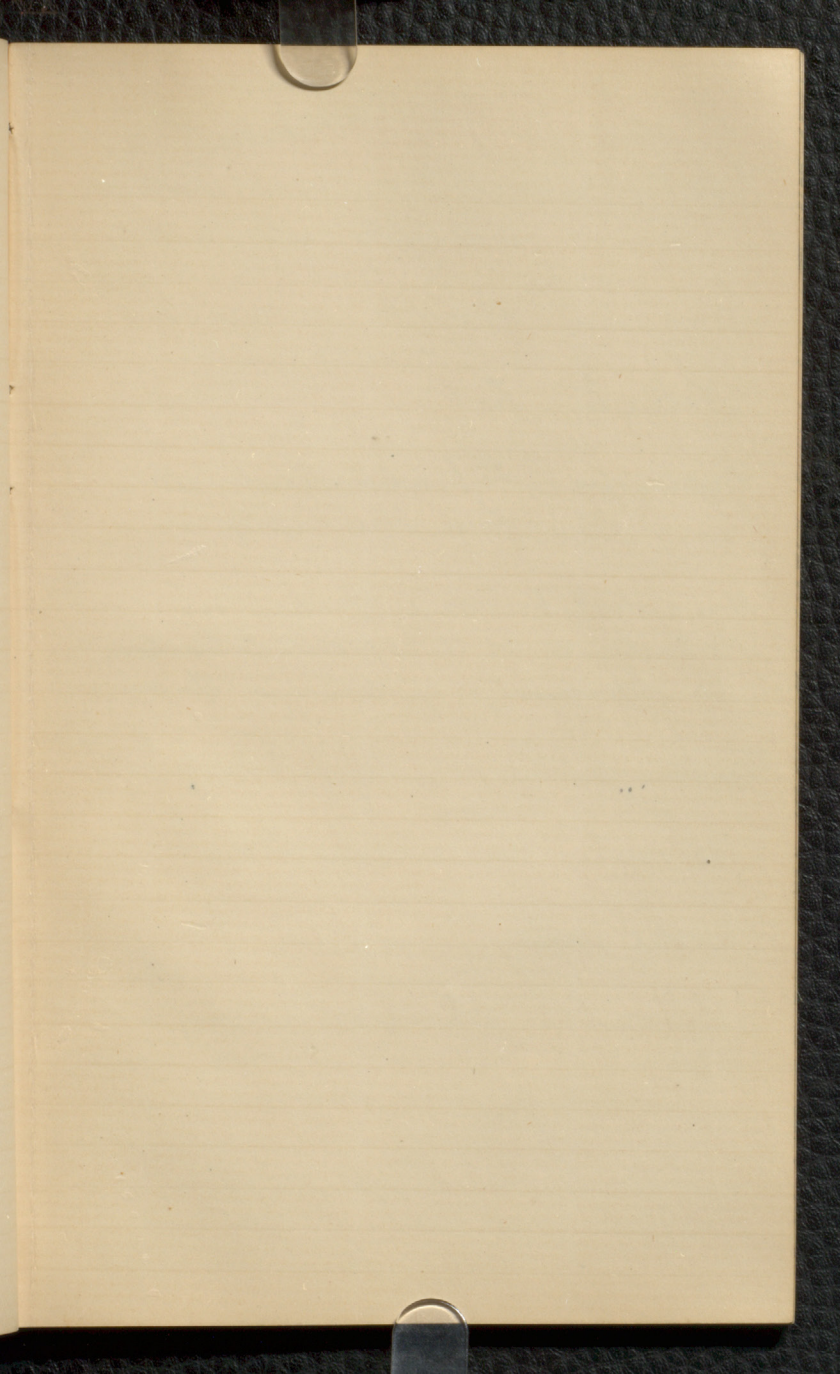


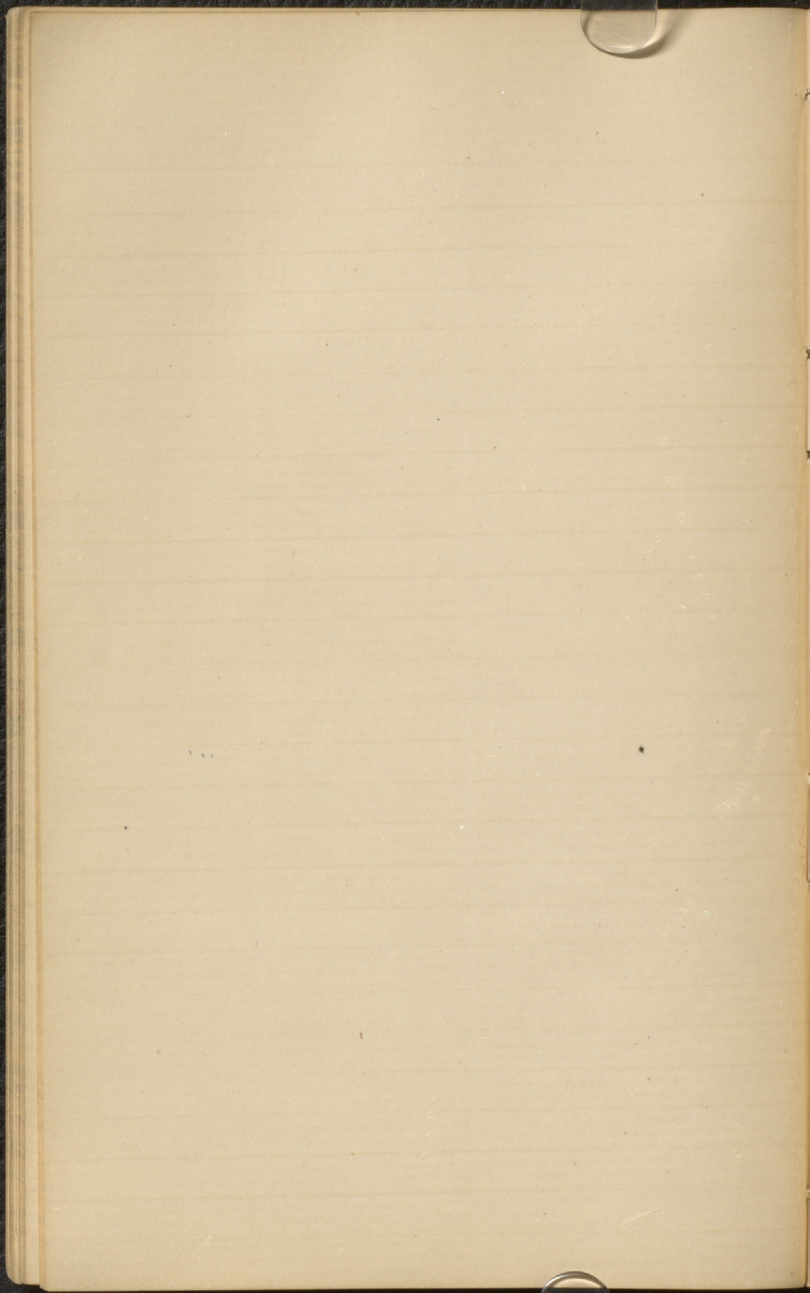












Cannot describe distribution
of species, but merely the
localities where occurring -

Notes to Lot -

Includes - Labrador Hudson Bay
Lake Winnipeg -

How I describe some species in
detail so as to afford collector
an opportunity of deciding species.

Make a Concluding Chapter -
on
What animals likely
come into Canada &
should be looked for -

Notes

Lutra Destructor - Barndton -
Elk or ~~Cerv~~ wapiti - note
Small - weasel; Little Brown -
throughout Canada - L. Superior
Bayfield - Saskatchewan - Rich.

Says Least Shrew *S. parvus*. Say
all over Canada - as far north
as Behring's Straits.

Jumping Mouse - This little species
is found according to Richardson
as far to the north as great Slave
Lake, Lat. 62°.

Found in both Upper & Lower Canada.

Names - I. C. St Paul -

Depue - Hudsonicus

" Americanus

" Canadensis

Meriones Americanus -

"It is generally believed, that the Jumping
mouse, like the Hamster of Europe,
passes the winter in a profound
lethargy."

"Naturalists residing in the Northern
& Middle States could easily solve
this &c &c &c"

Polar Bear - on the Coast of
Hudson Bay -

Panther - both upper & lower
Canada -

" The climate of Lower Canada
Newfoundland & Labrador,
appear to be too cold for its
permanent residence
Specimens from Montreal

~~Hoary Marmot found around
Hudson Bay -~~

Hoary Marmot Hudson Bay -

~~Mole Shaped~~

{ Yellow-checked Meadow Mouse
Arvicola x anthognatha -
Leach -
Hudsons Bay & Labrador -

Hudsons Bay Summer
Arvicola Hudsonia. Rich.
Hudson Bay & Labrador,

Little Black Mink }
Mountain - Brook Mink }
Putorius nigrescens. - And Barb.

Anderton met with this species
in Canada, northern N. York to
Vermont.

Marsh Shrew - abundant
all through Canada to
Hudson Bay -

~~Shitoe out Bank Mouse -~~

Severn River Flying Squirrel
Pteromys Sabrinus. Pennant

(Northern Squirrel of David
Found on the shores Lake Huron
at the right of James Bay,
also in the neighbourhood of
Quebec - And Barb.

Sharp-nosed Arvicola -
arvicola nasuta. - And Barb.
Falls of Niagara - And -

Red-backed mouse further
particulars -

~~Coast Shrew; Long nosed Shrew.~~
Strike out Coast Shrew -

Bank Mouse - a. Pennsylvanicus.
a. Ripon's bird.
Canada West - Niagara Falls -
Ireland -

Put the Marsh Shrew in place
of Water Shrew -

Coopers -
Sent. Color -

Hair cinerous for two thirds of
its length above, & tipped with
mourning Chestnut brown;
beneath tipped with ash color;
feet grey; tail brown above,
silver grey beneath

Labrador -

Foster

Color. The fur is for $\frac{2}{3}$ of its length dark cinereous above tipped with brown; beneath it is cinereous.

Fat flesh coloured; nails white -
Hudson Bay - Rich -
New York. De Kay

Strike out water

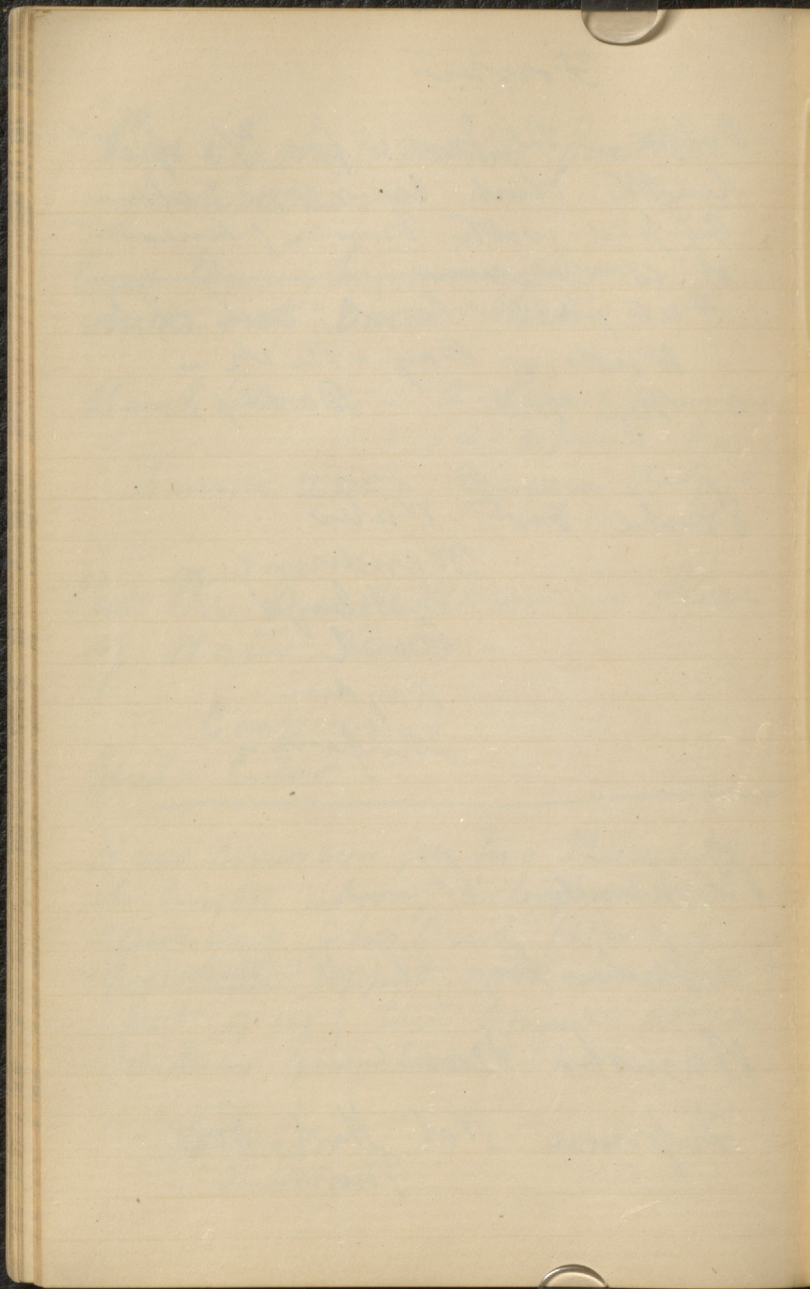
Wandering -
Suckley's
Eared
Hayden -
Thompson -

Richardson's

Hudson Bay M. W. Leconte -

Hamster Mouse.

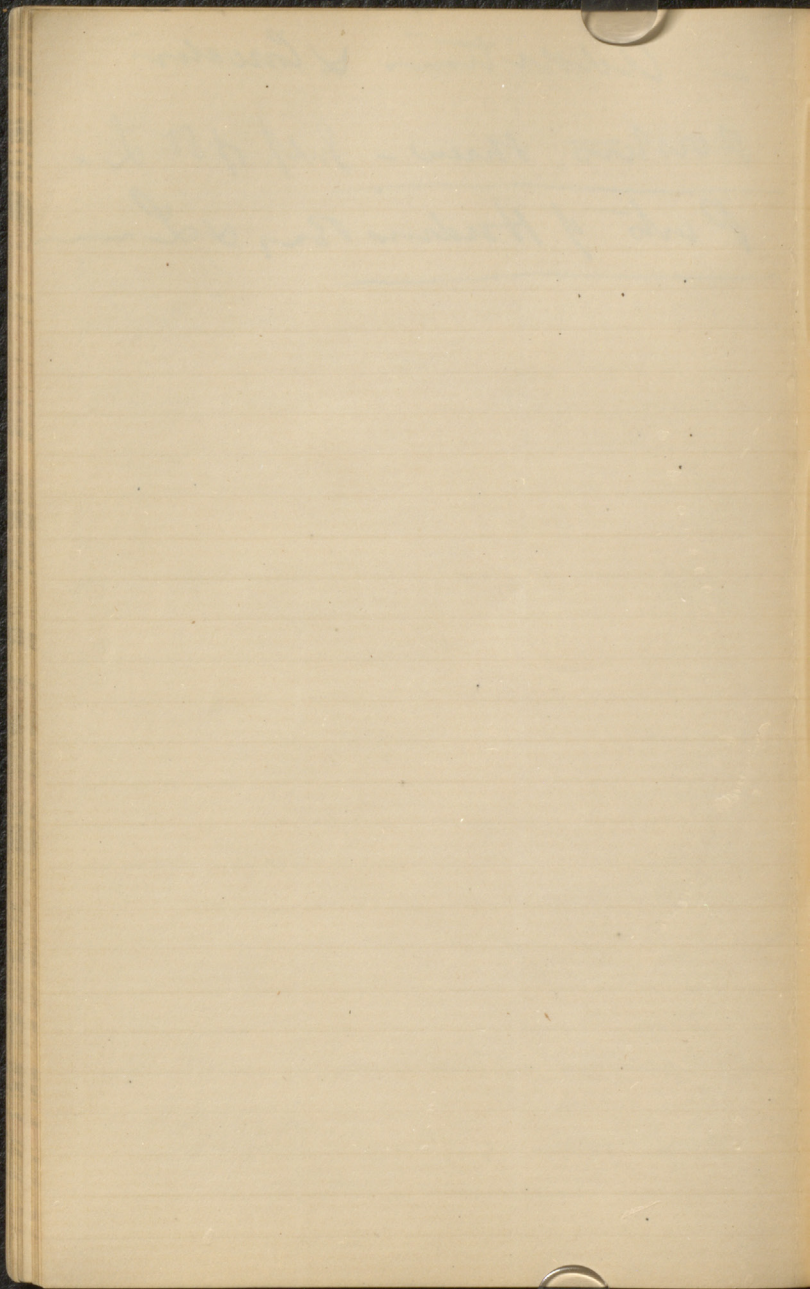
Supraire Nat. Hist. Soc. -
Montreal

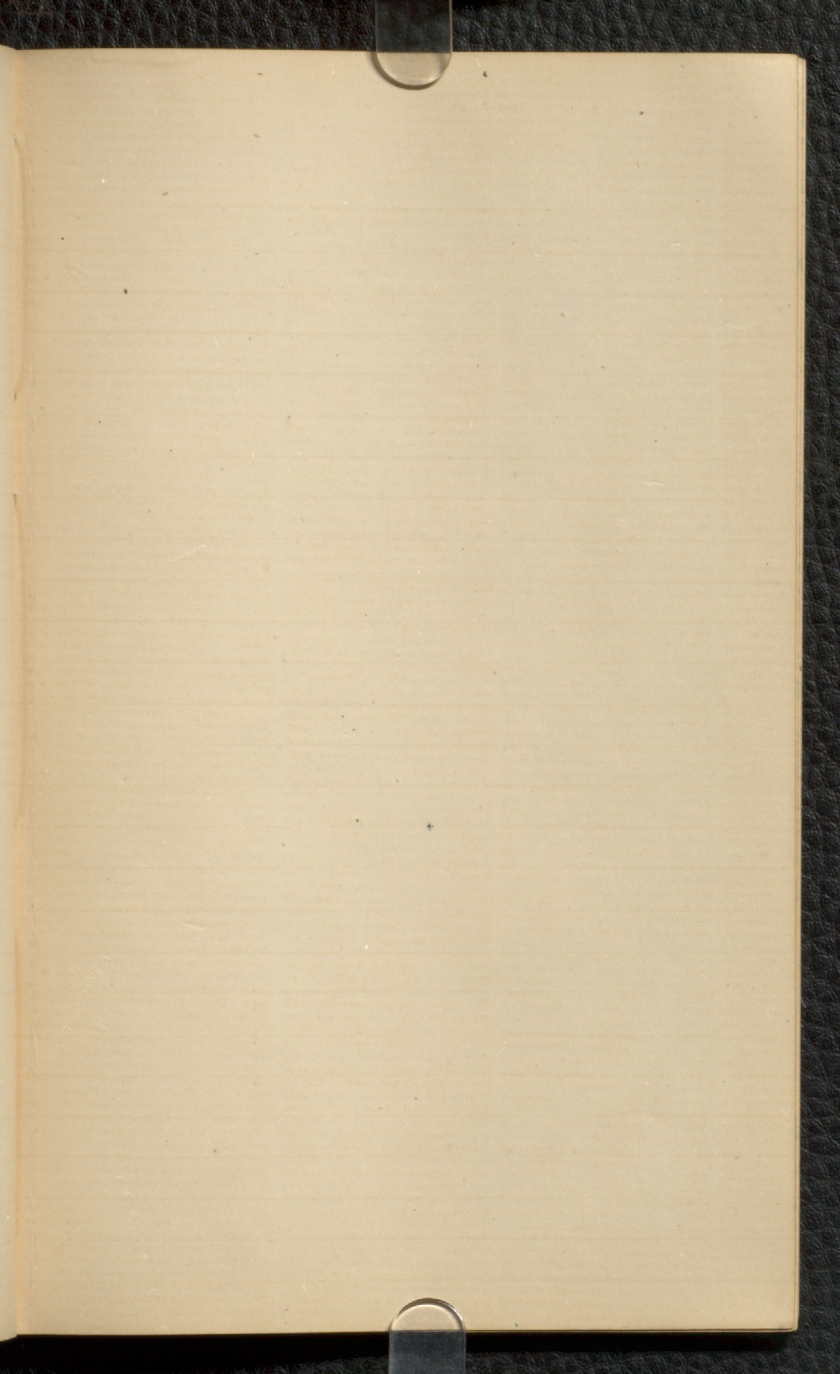


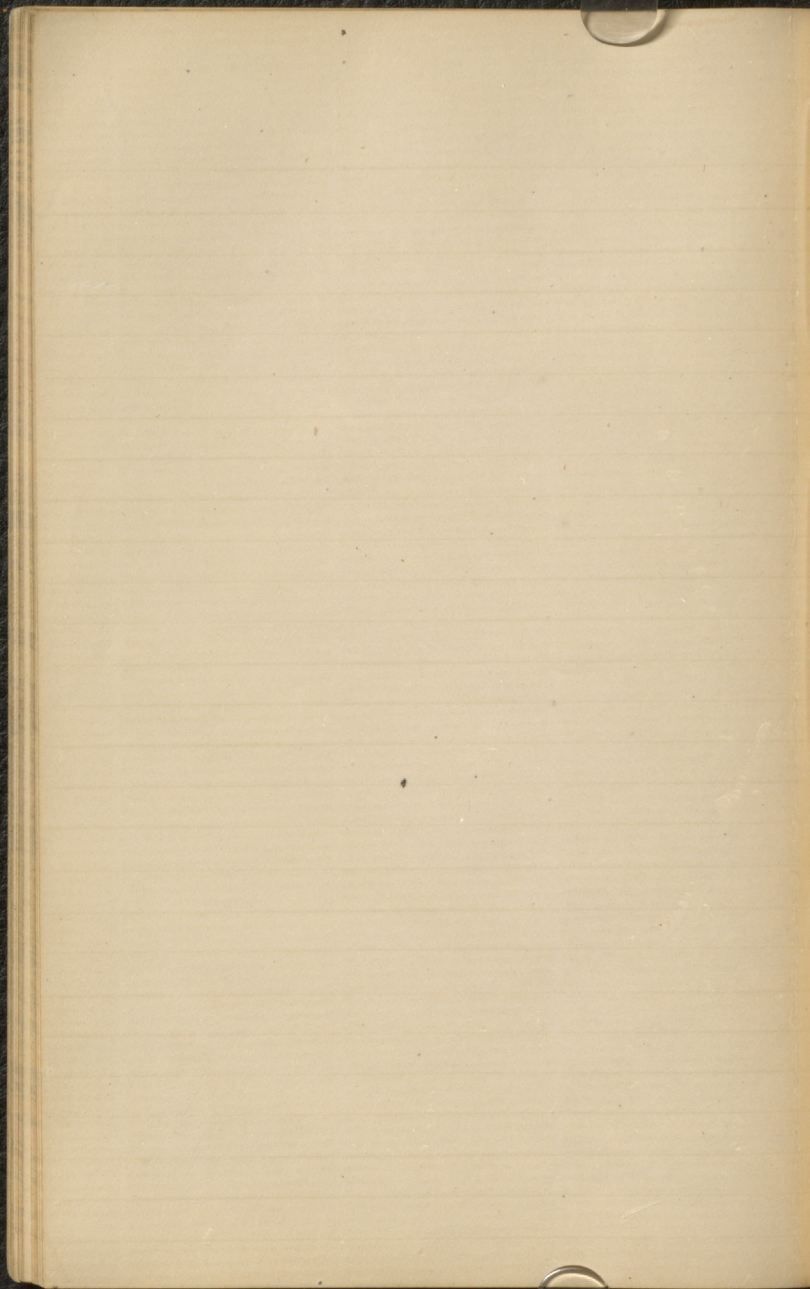
— Additions & Corrections

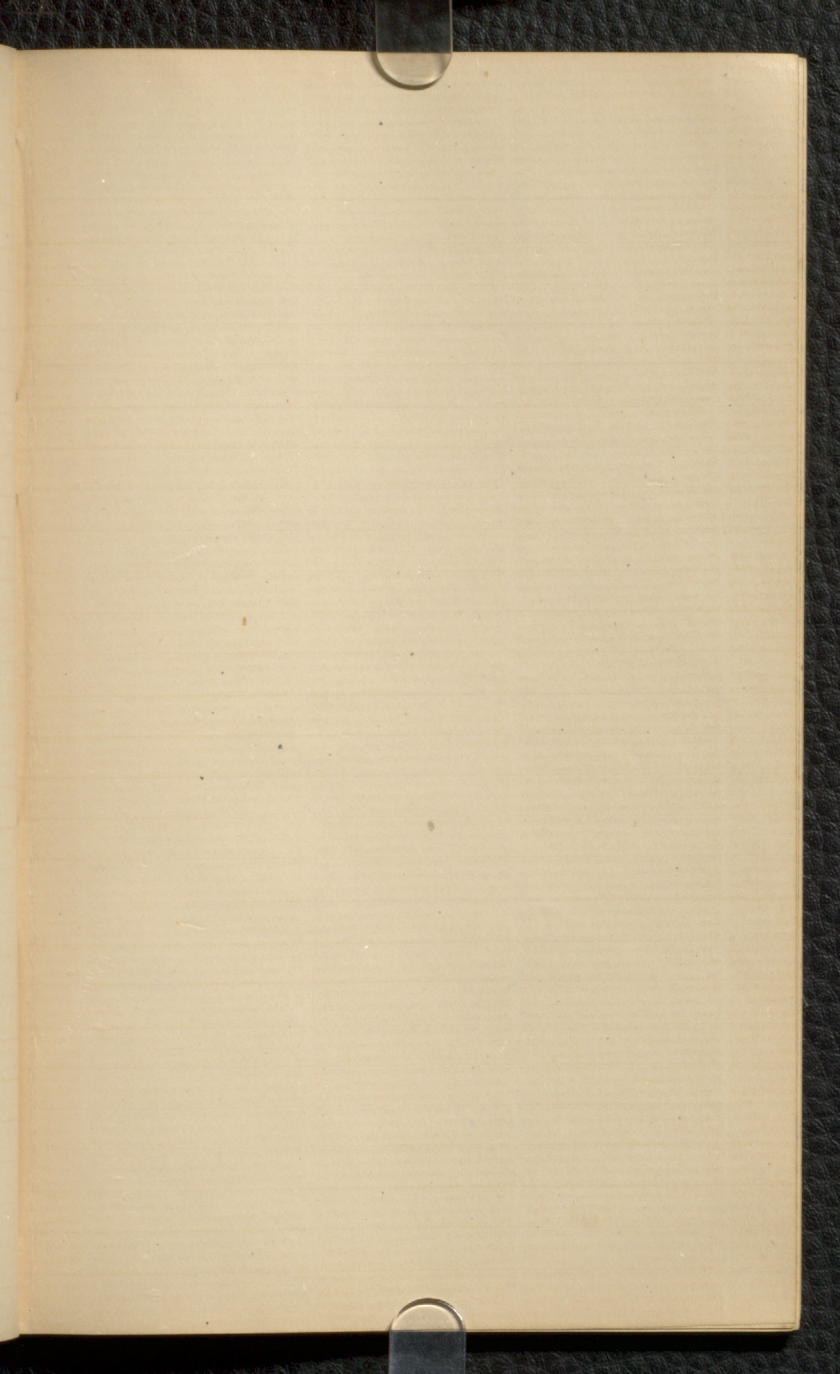
Forsters Shrew - July of 80 L -

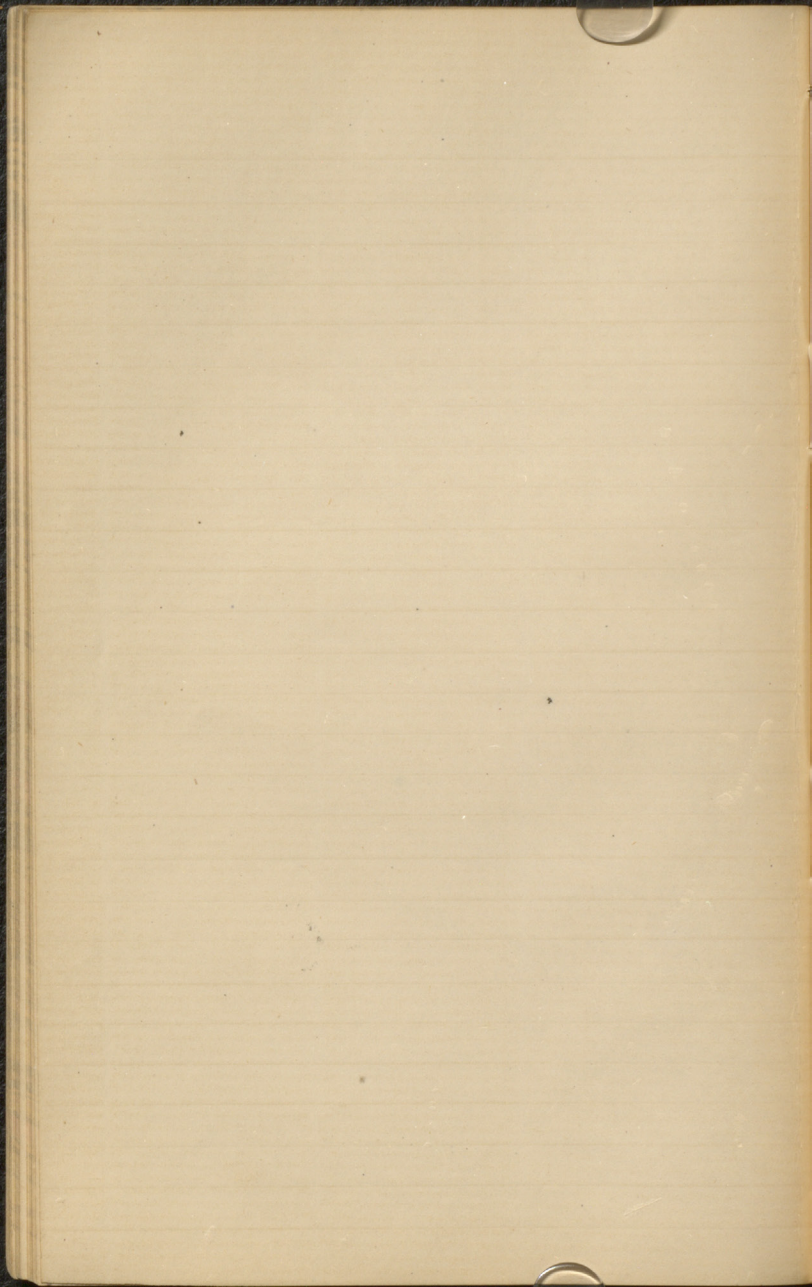
Parts of Hudson Bay & Linn

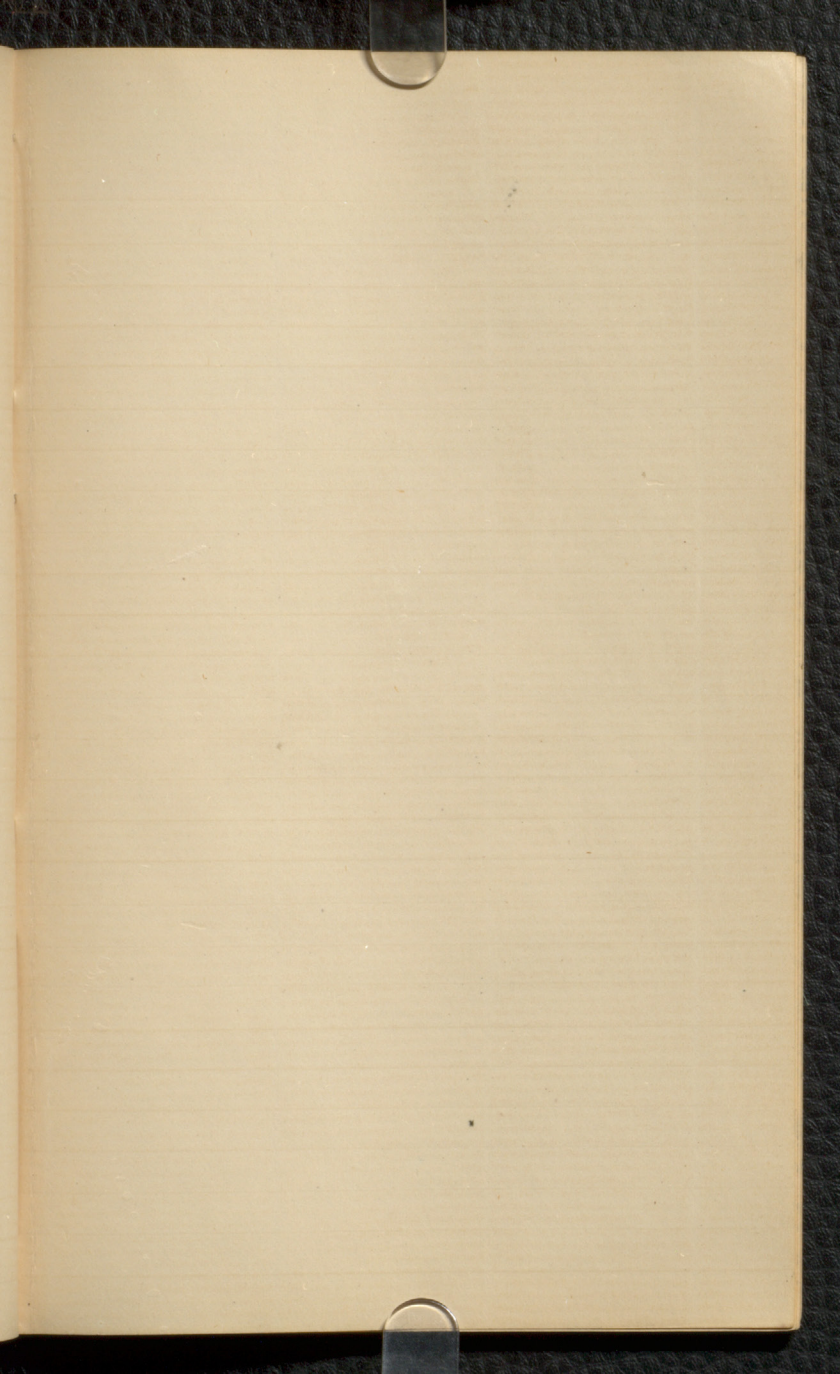


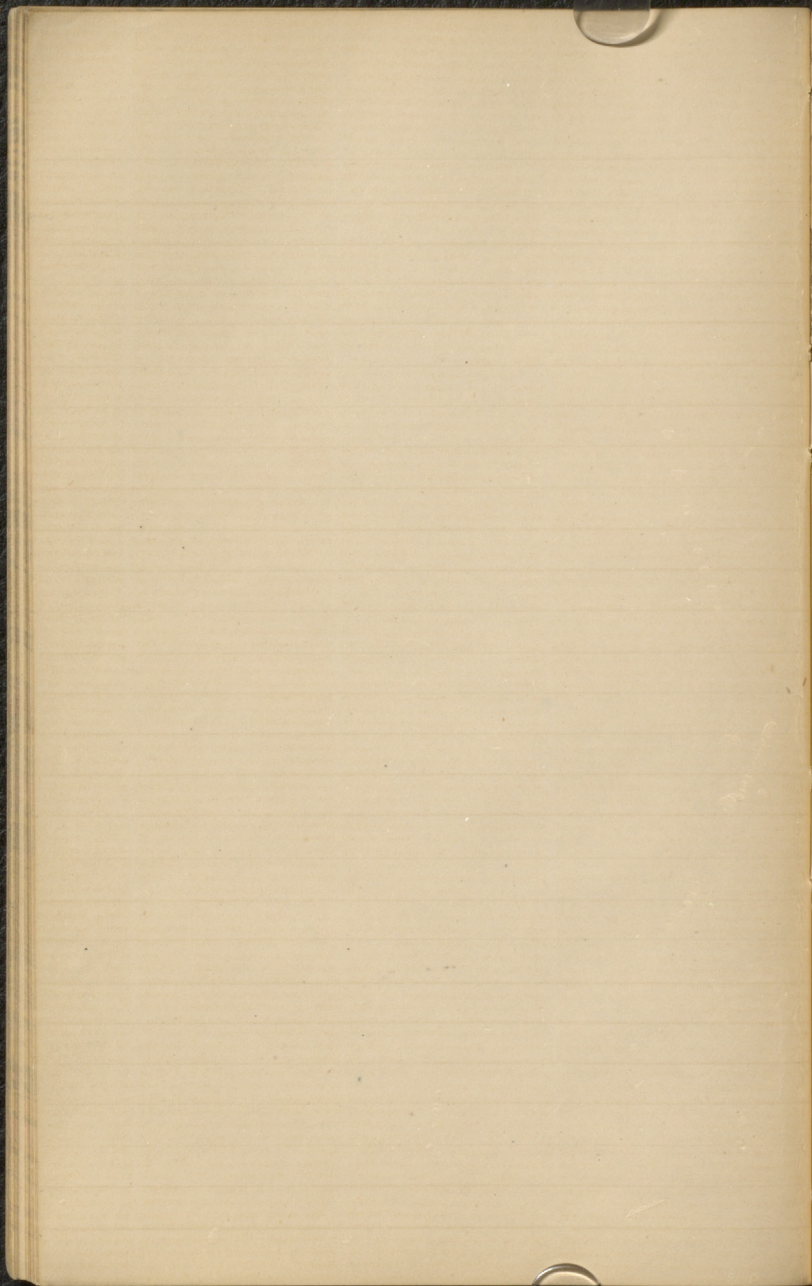


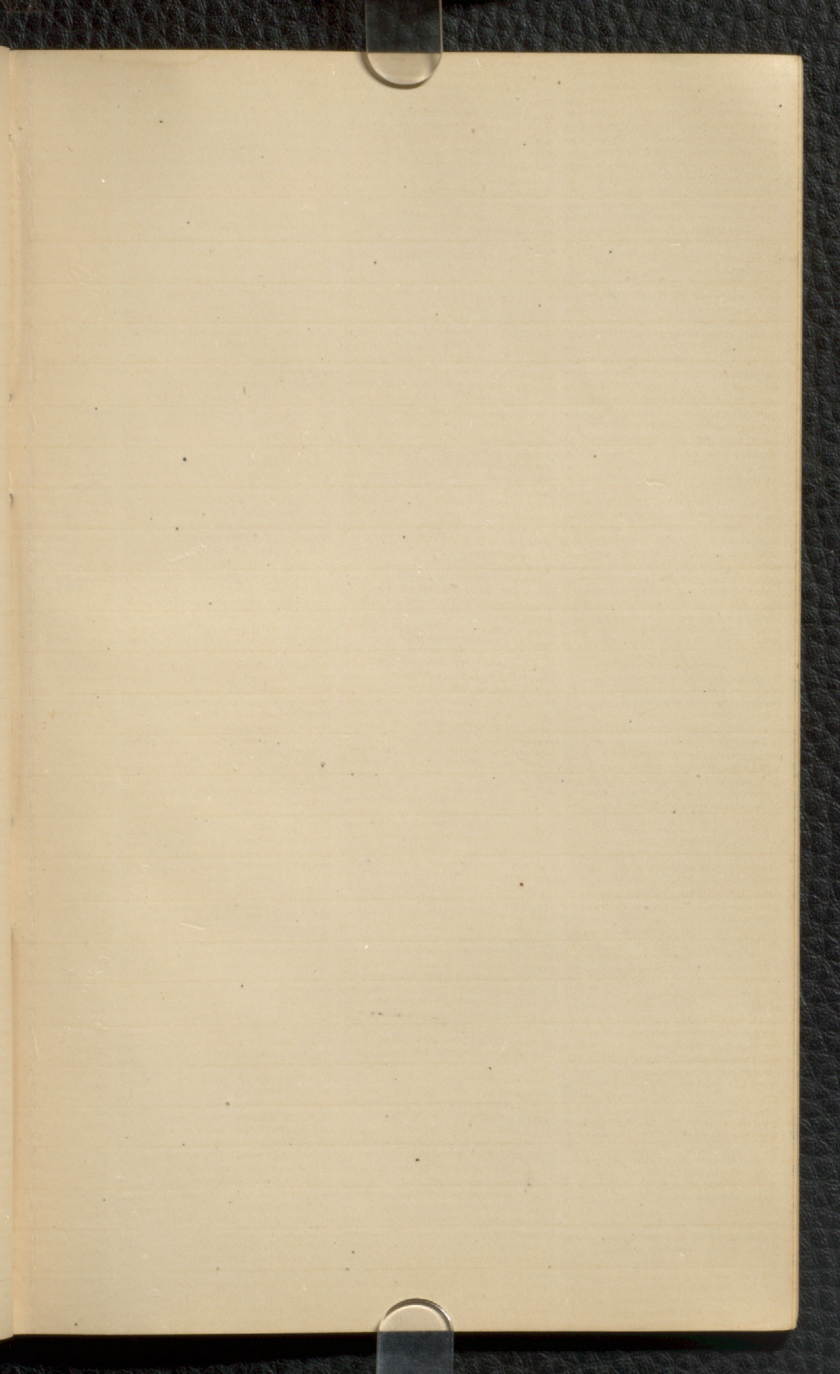


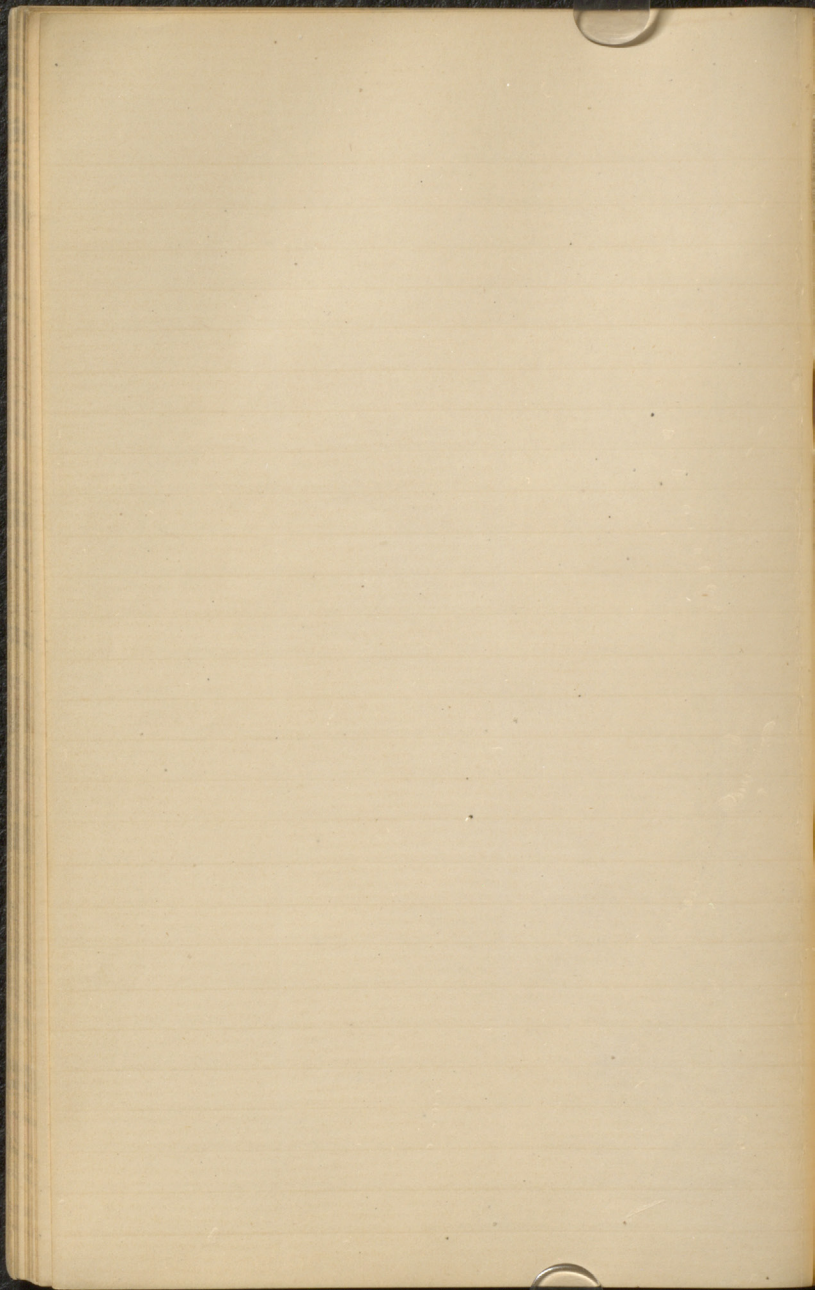


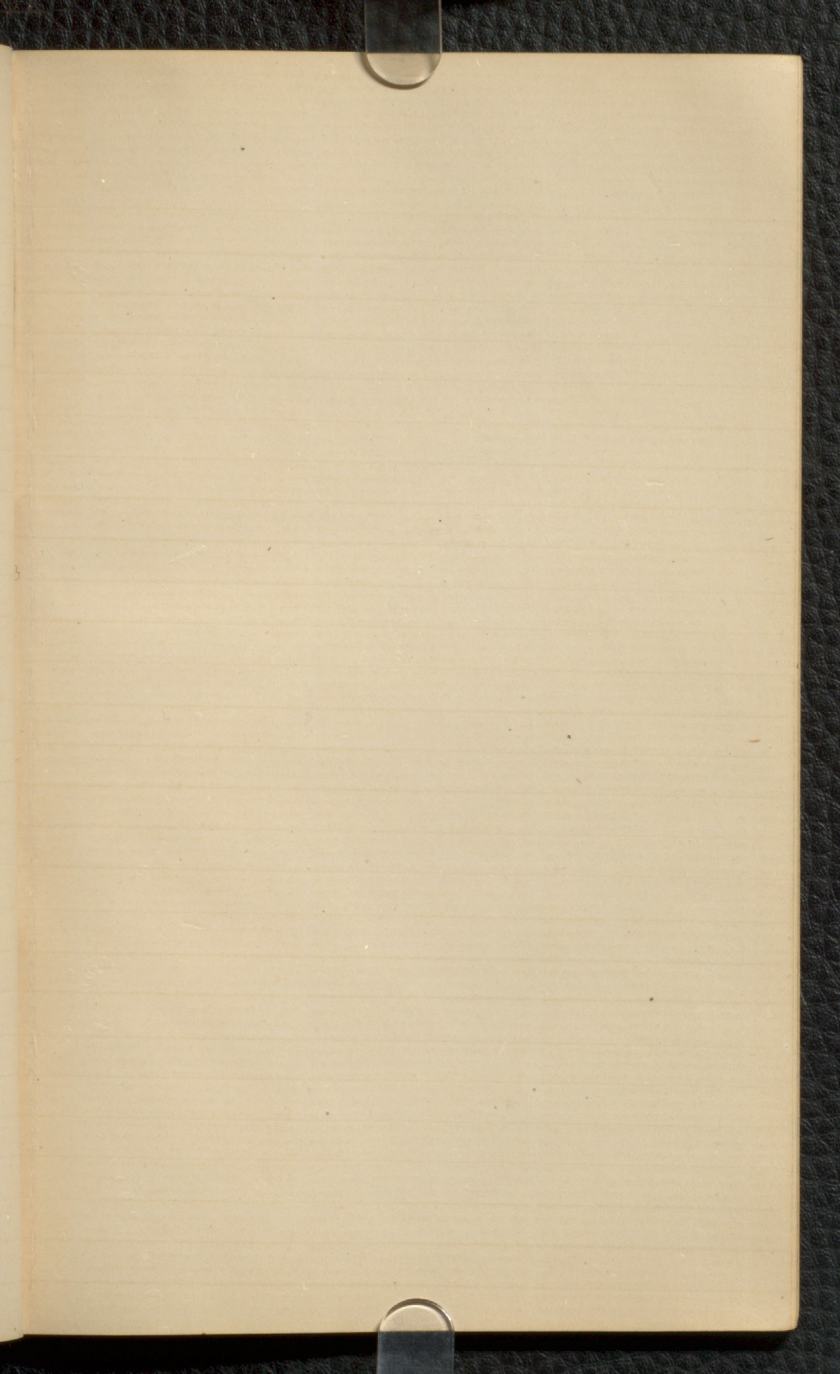


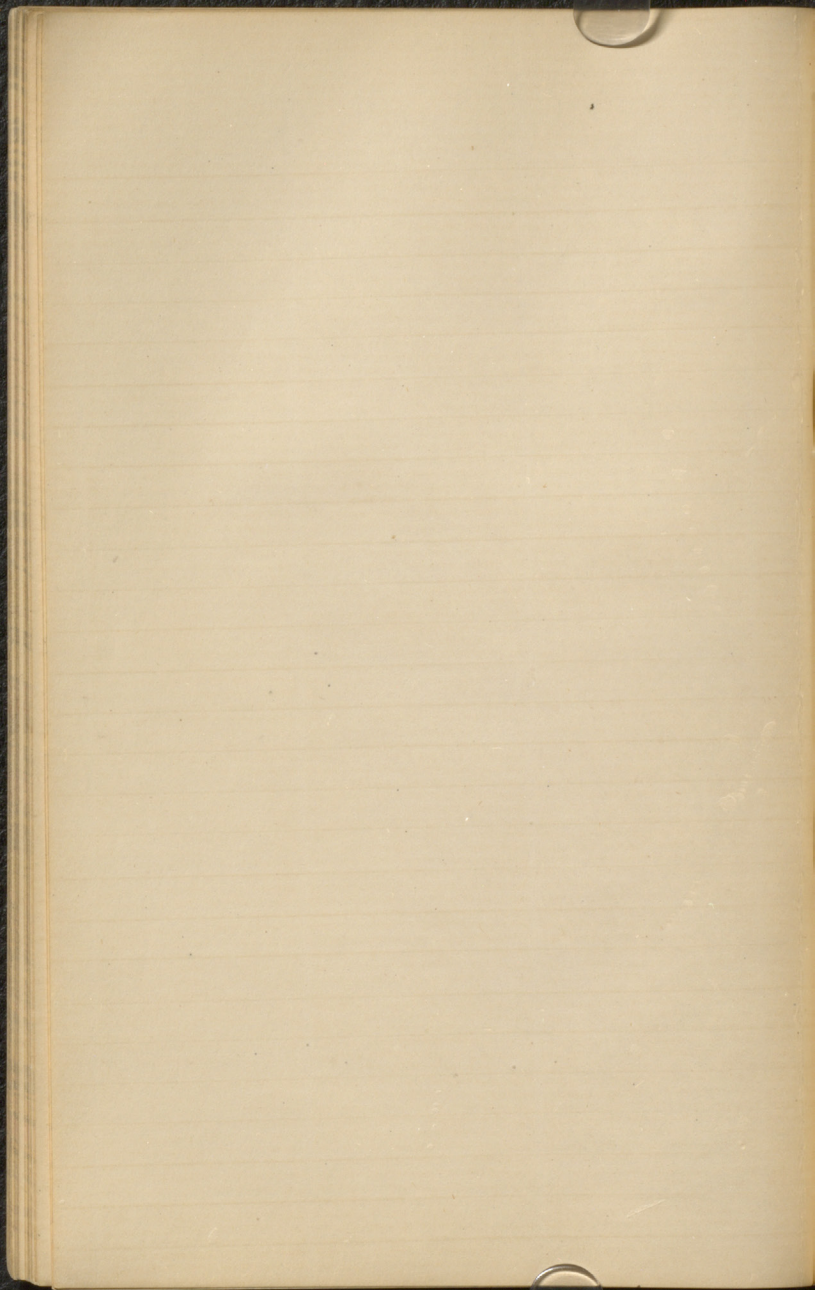


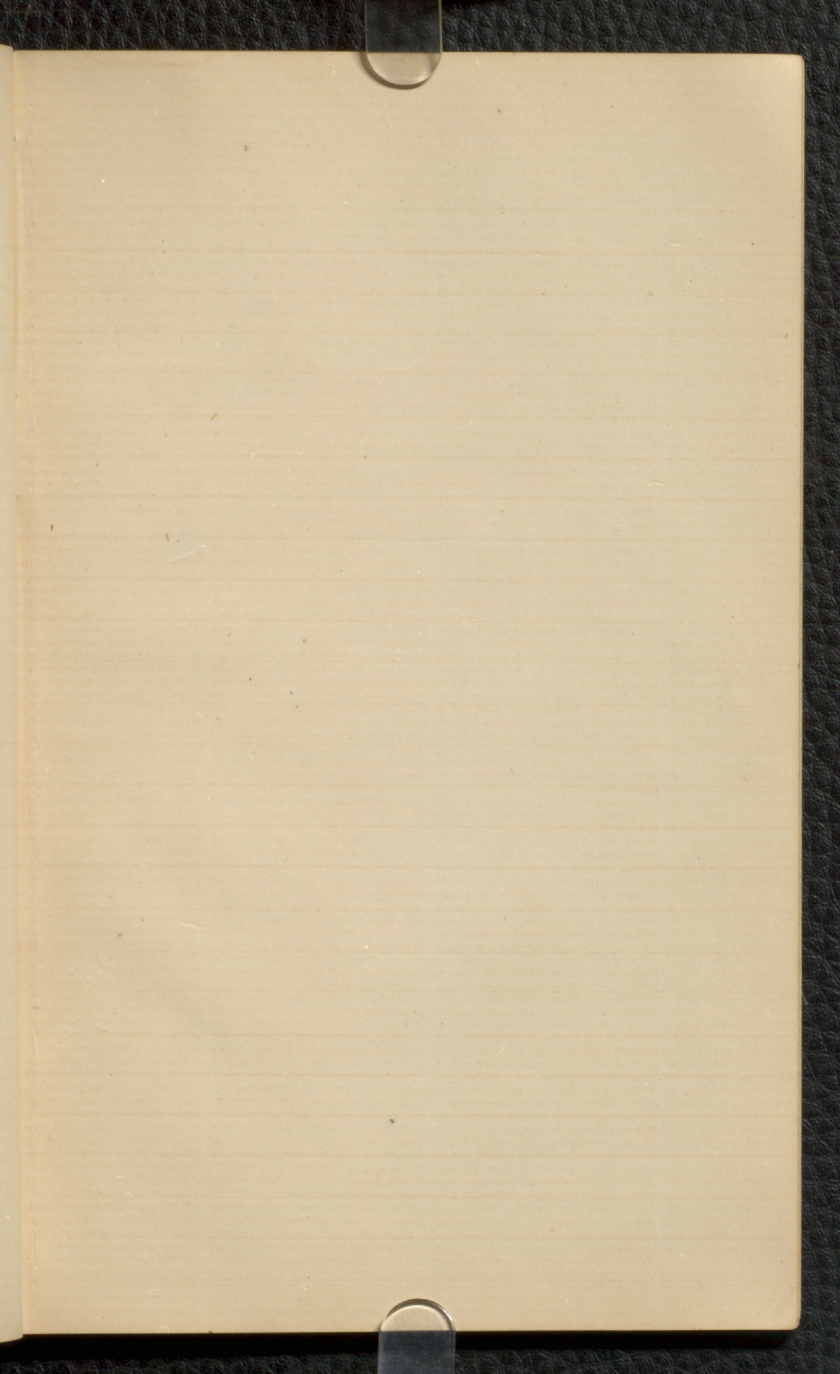


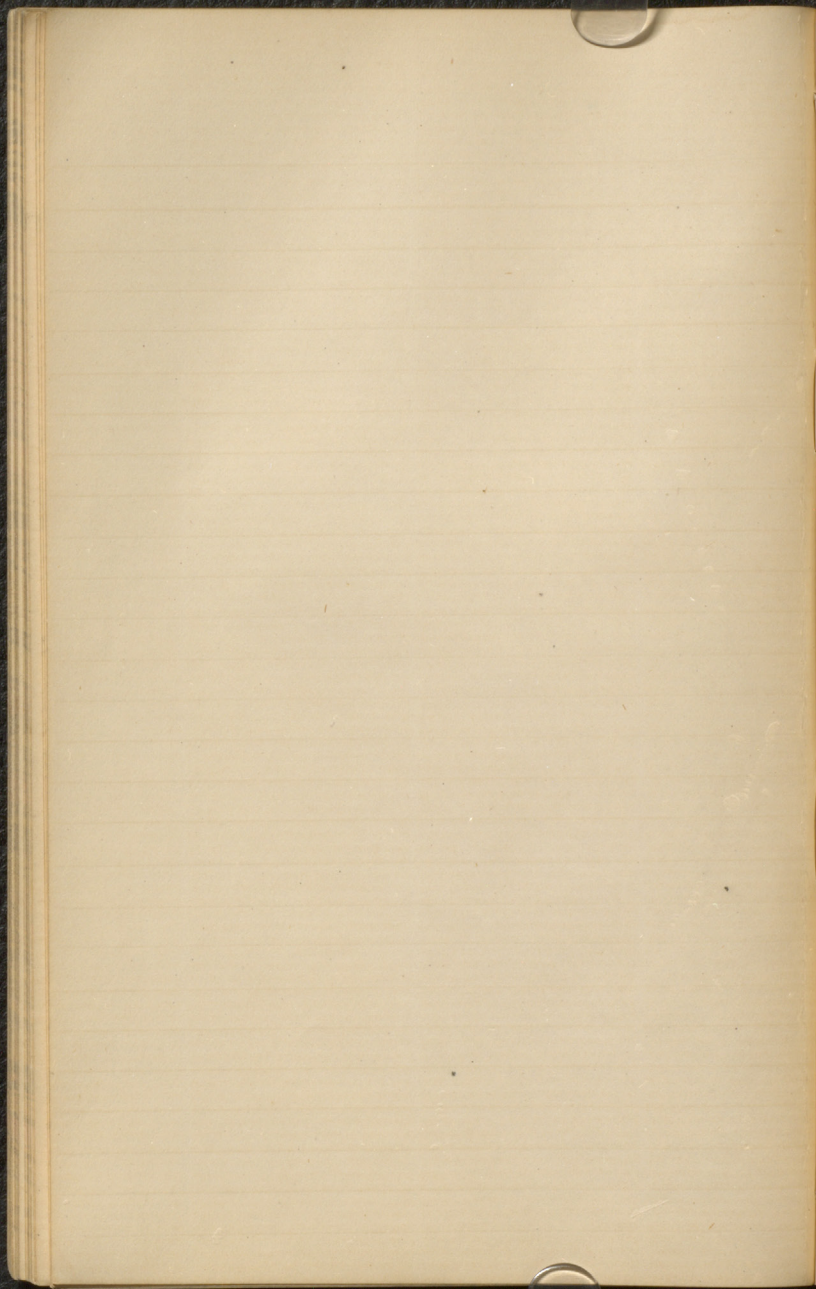


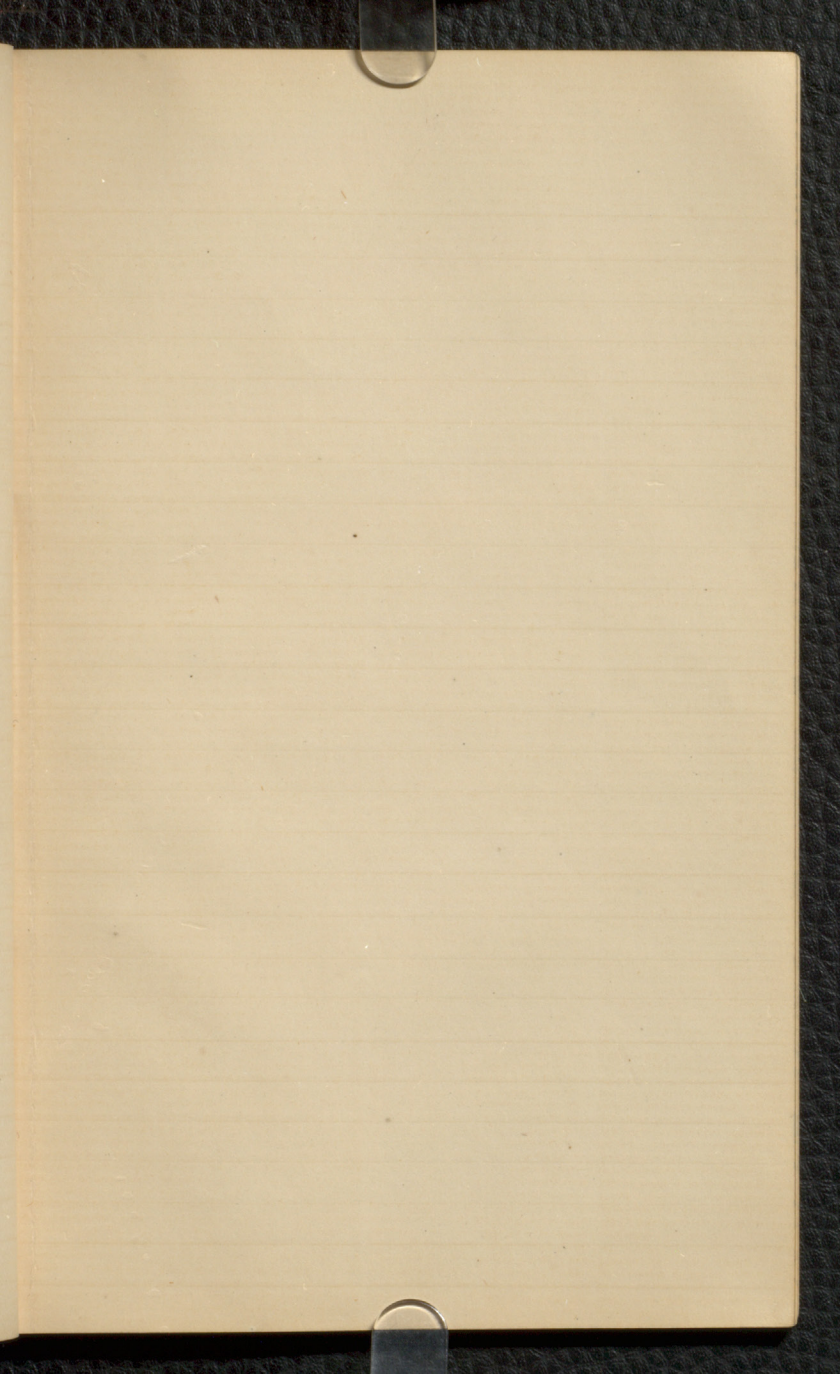


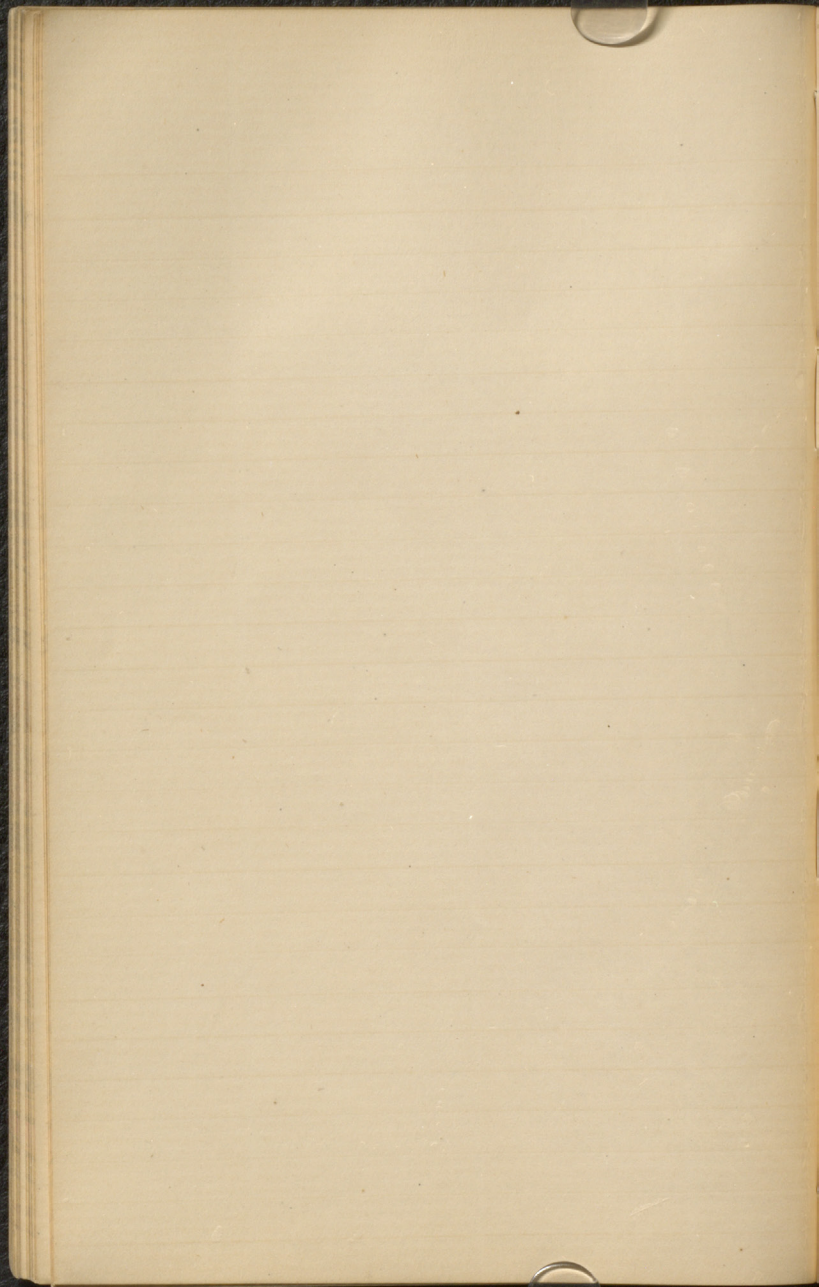


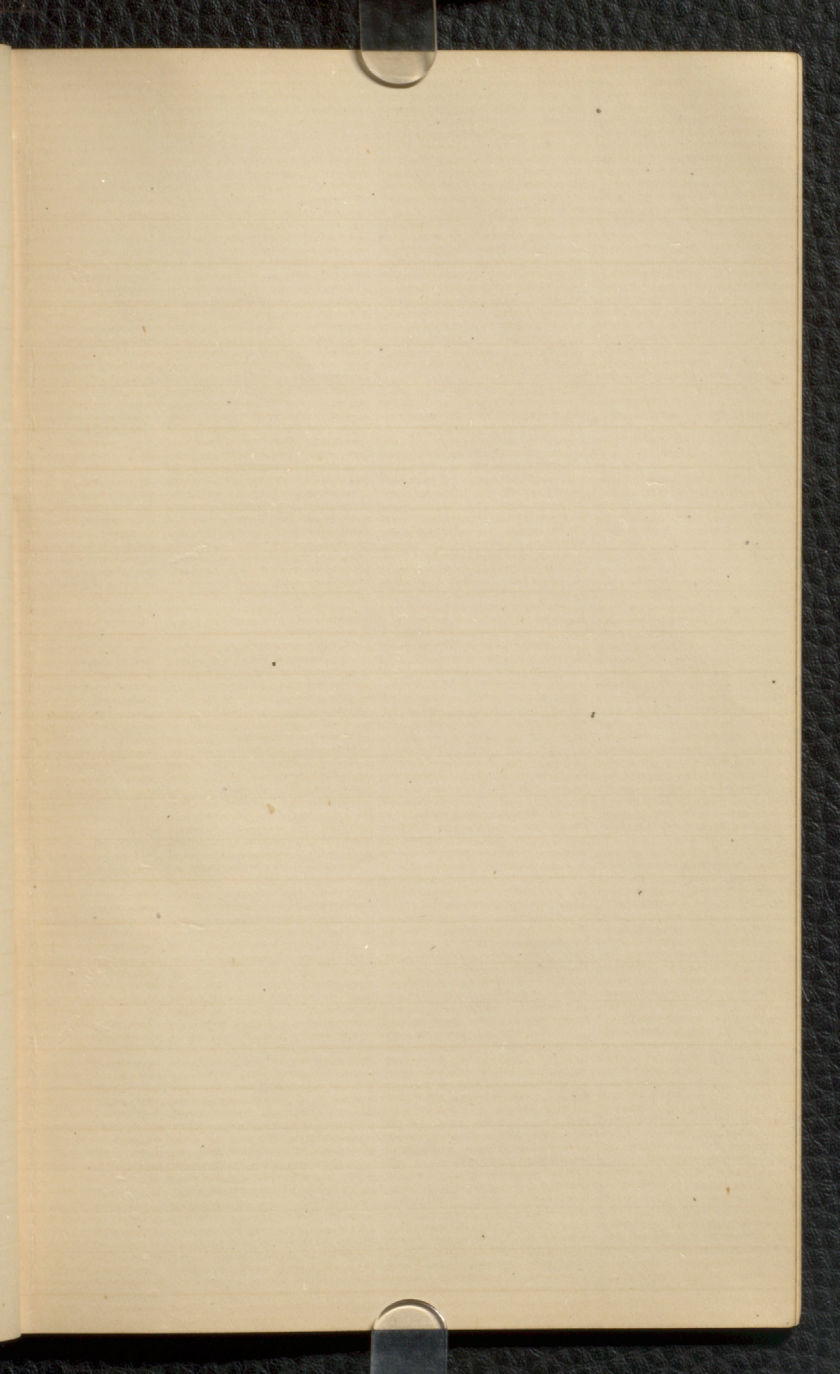


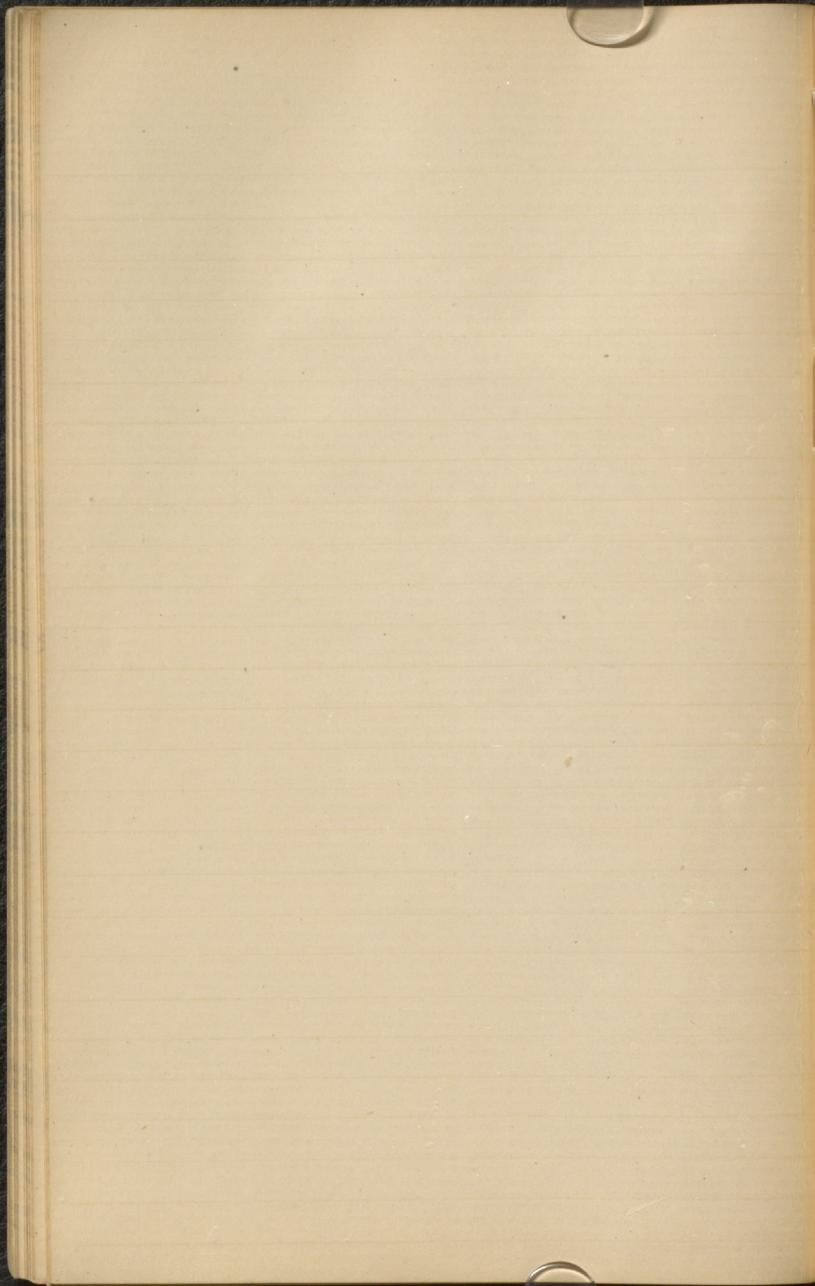


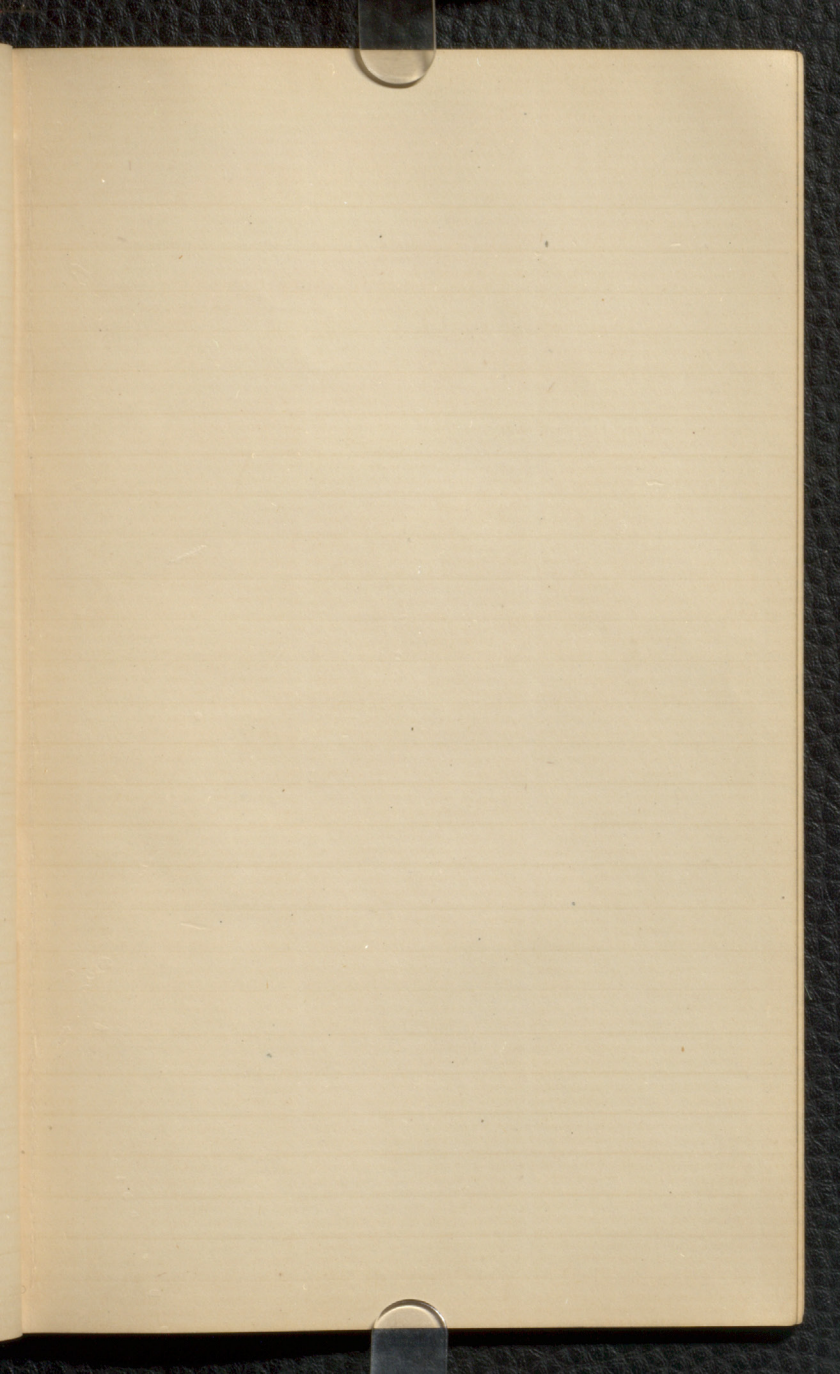


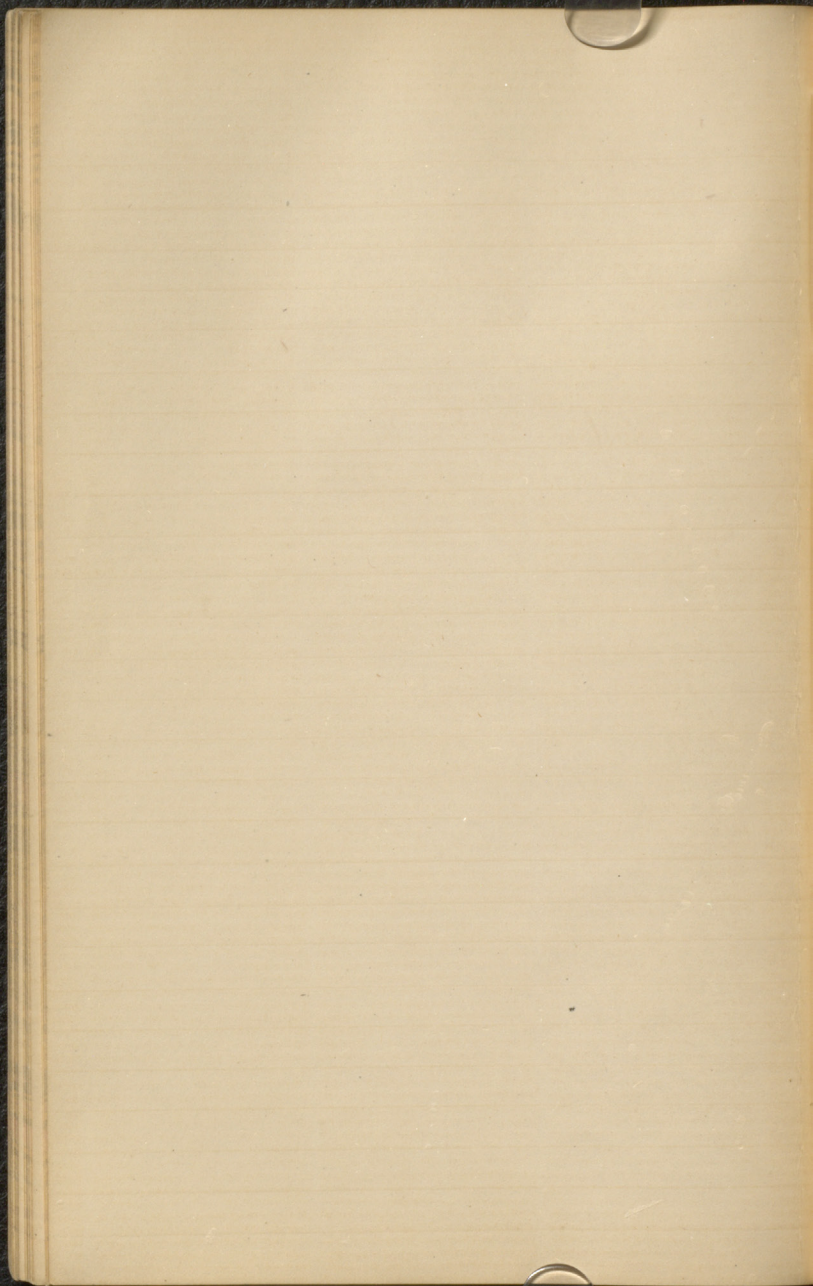


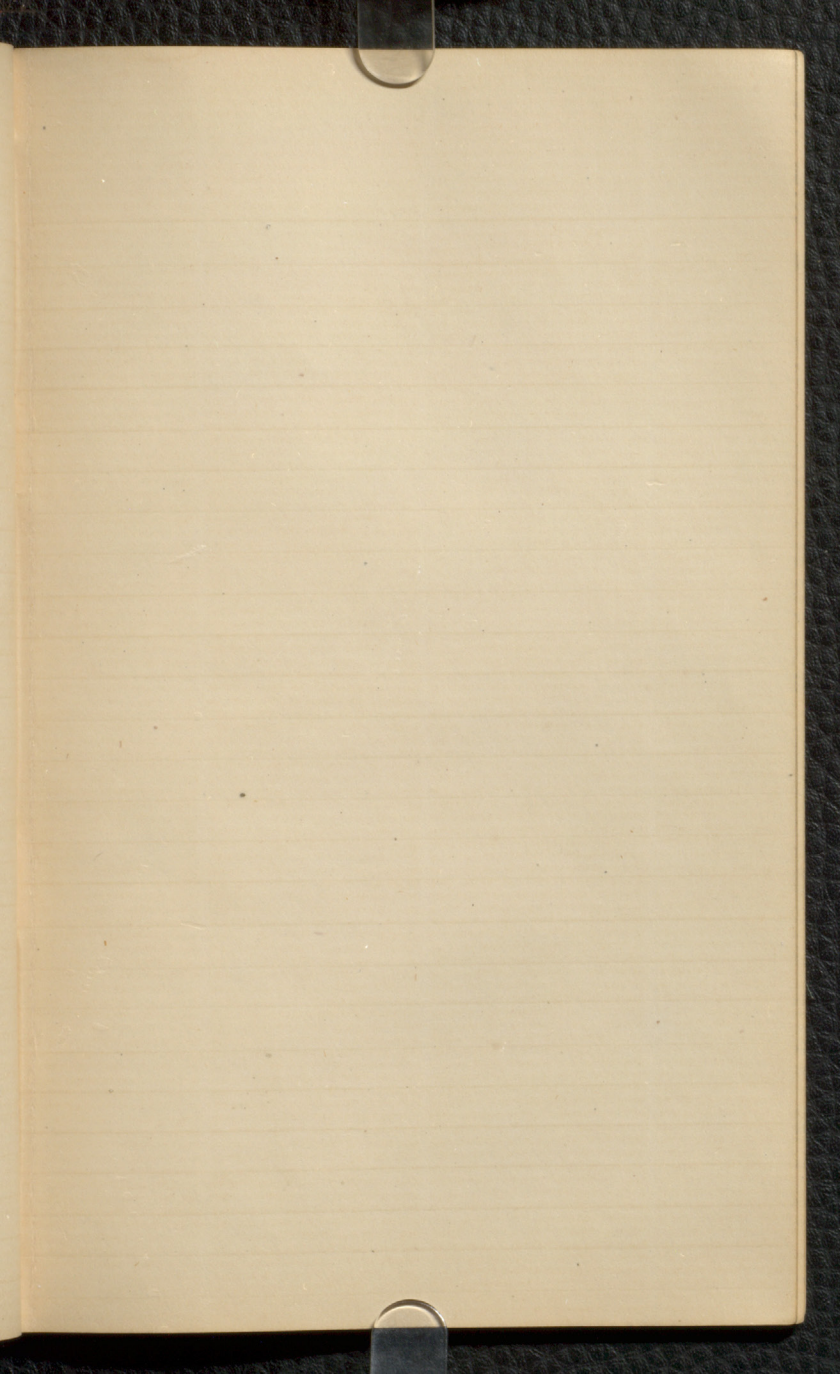


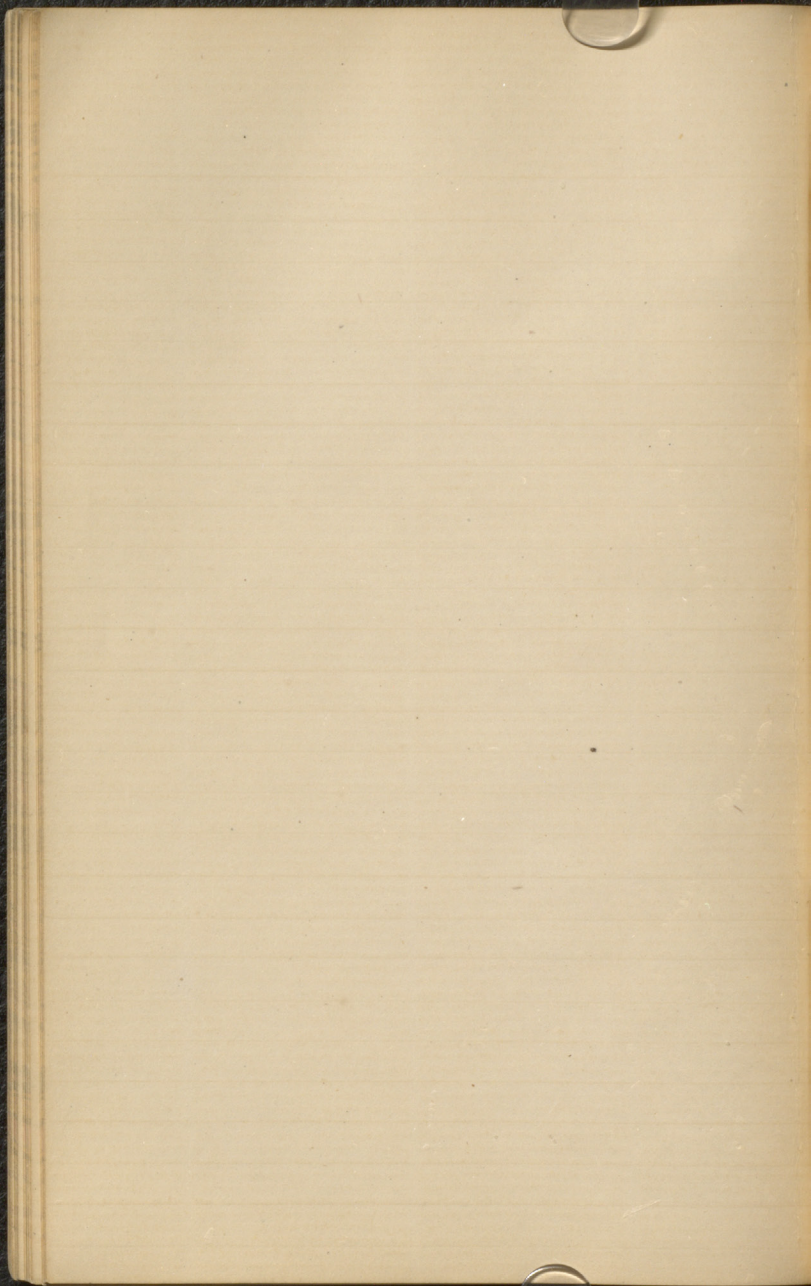


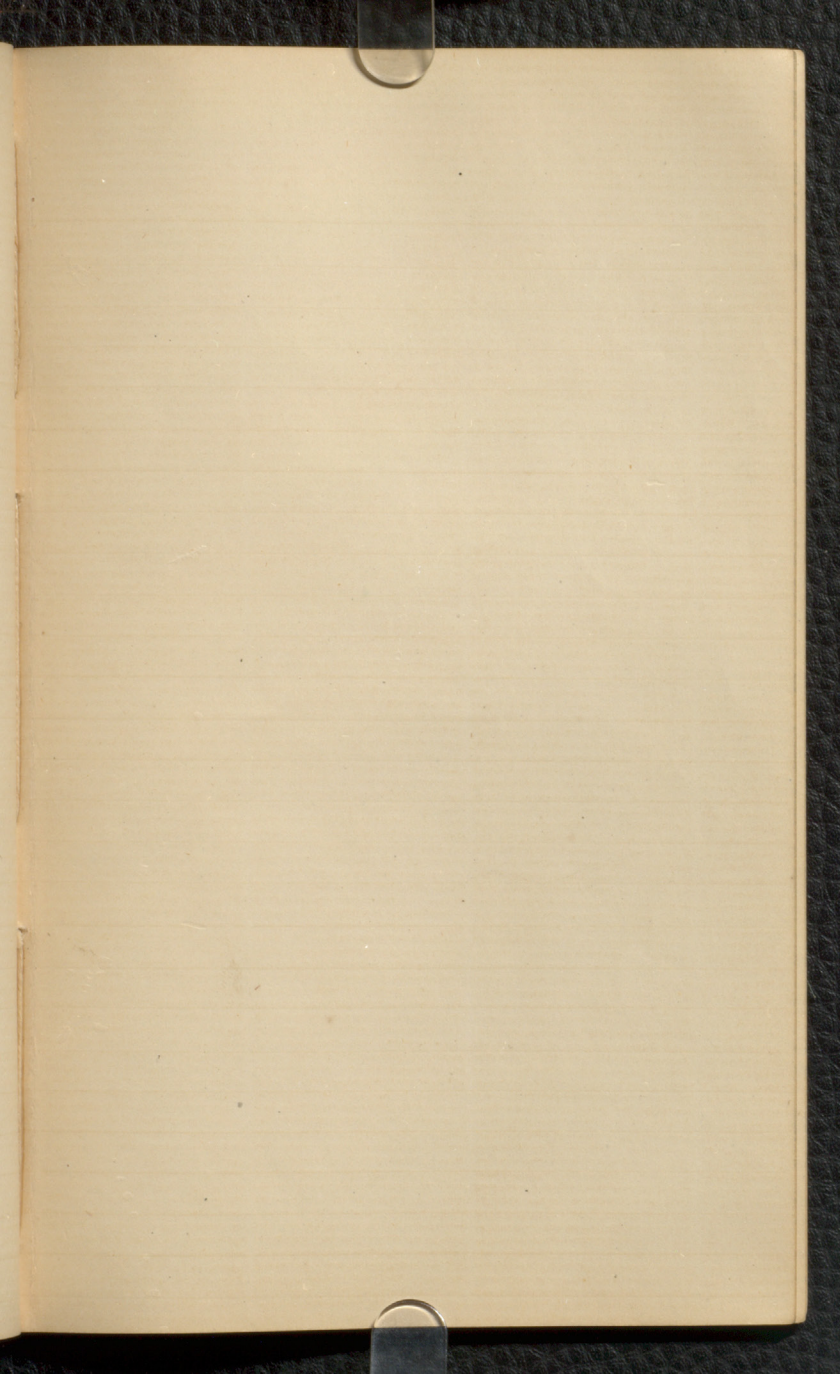


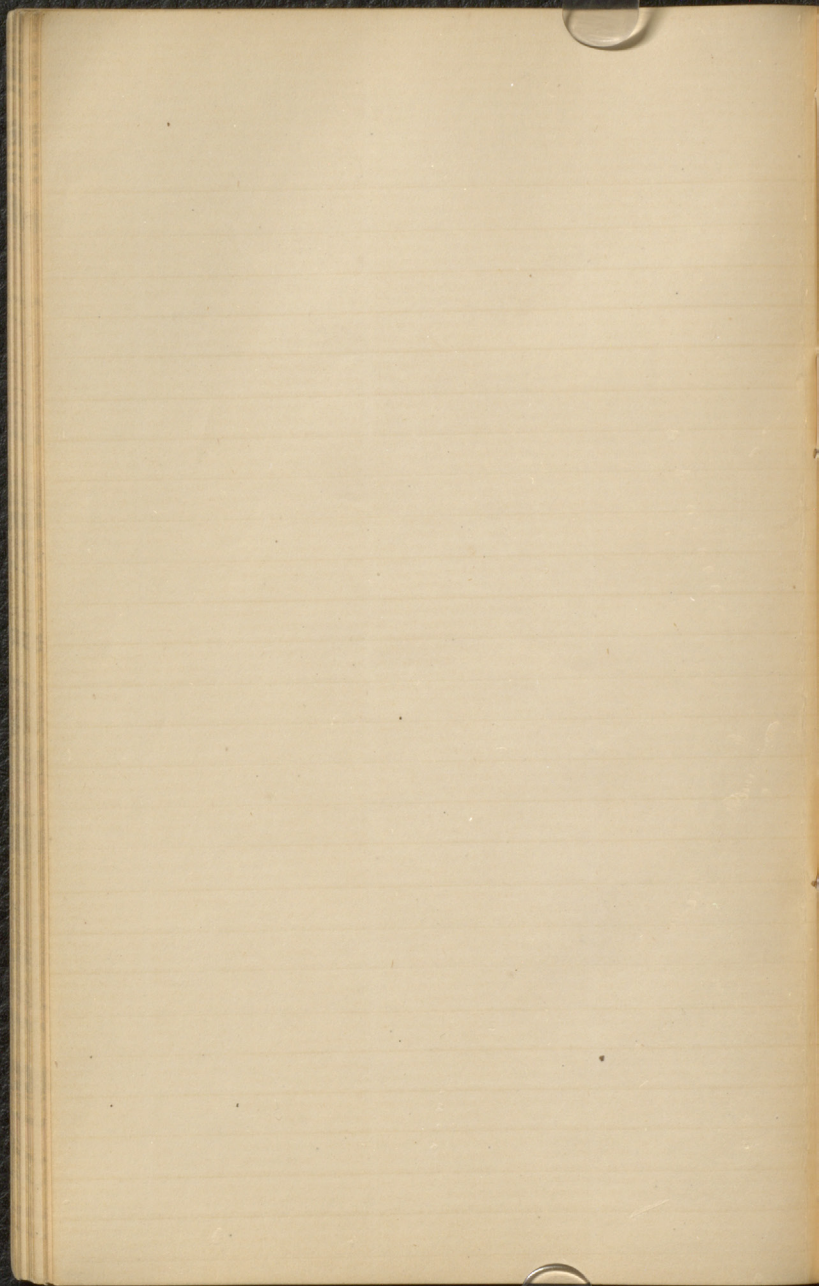


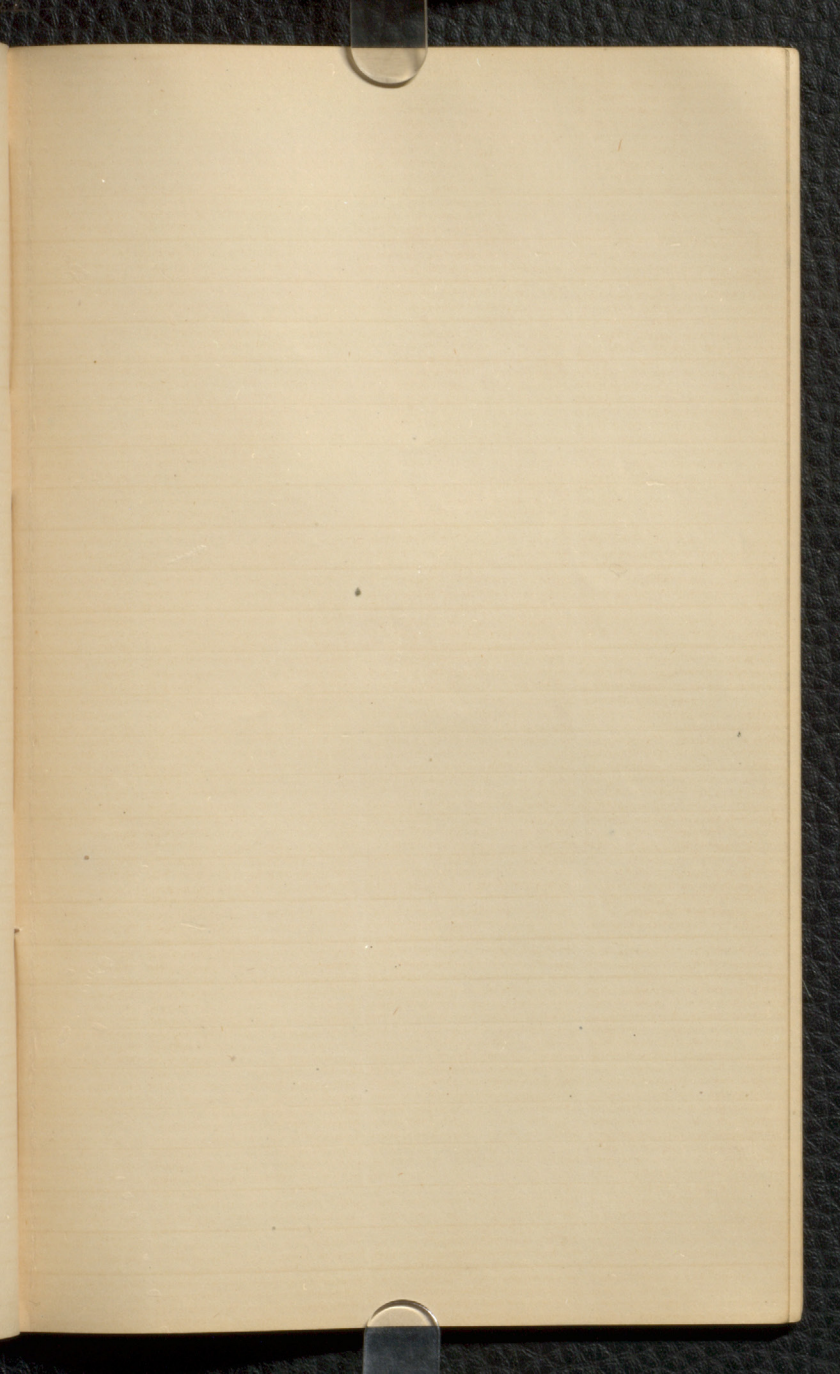


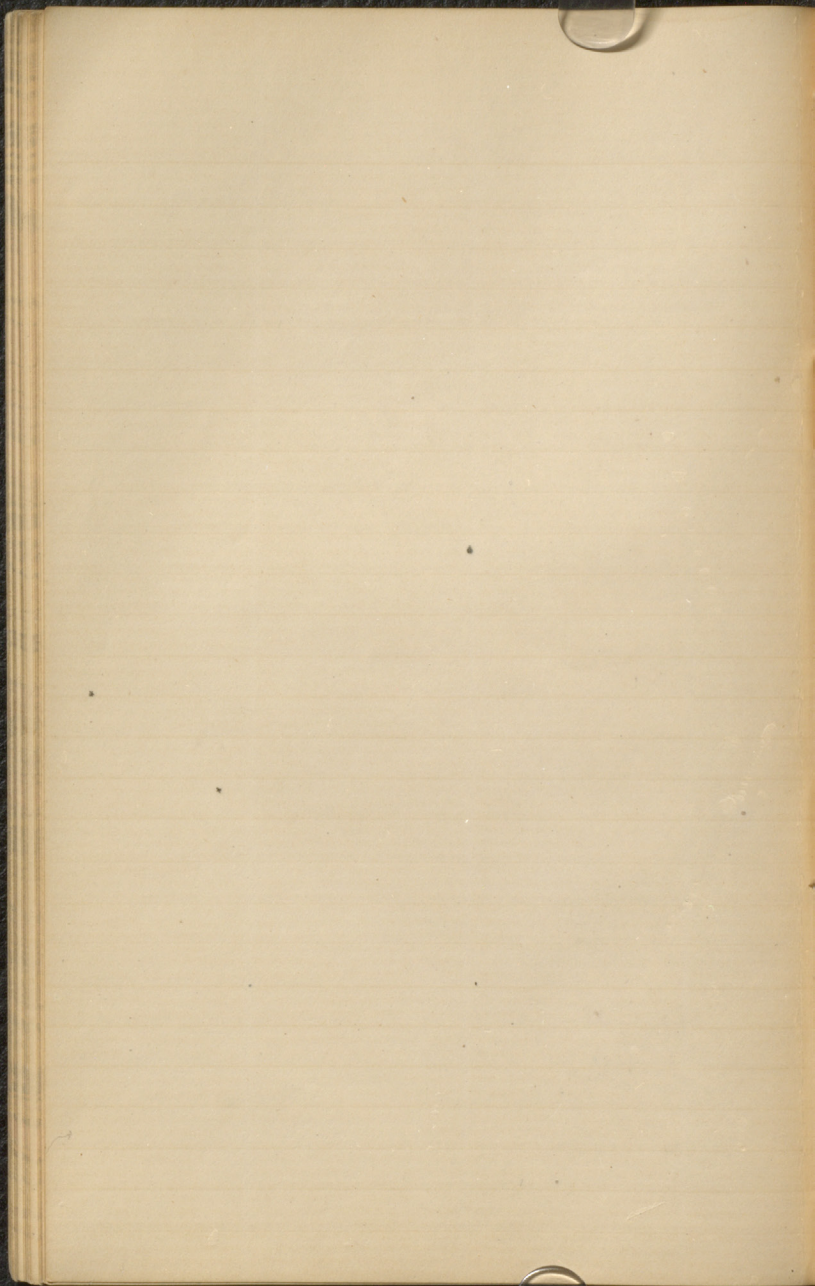


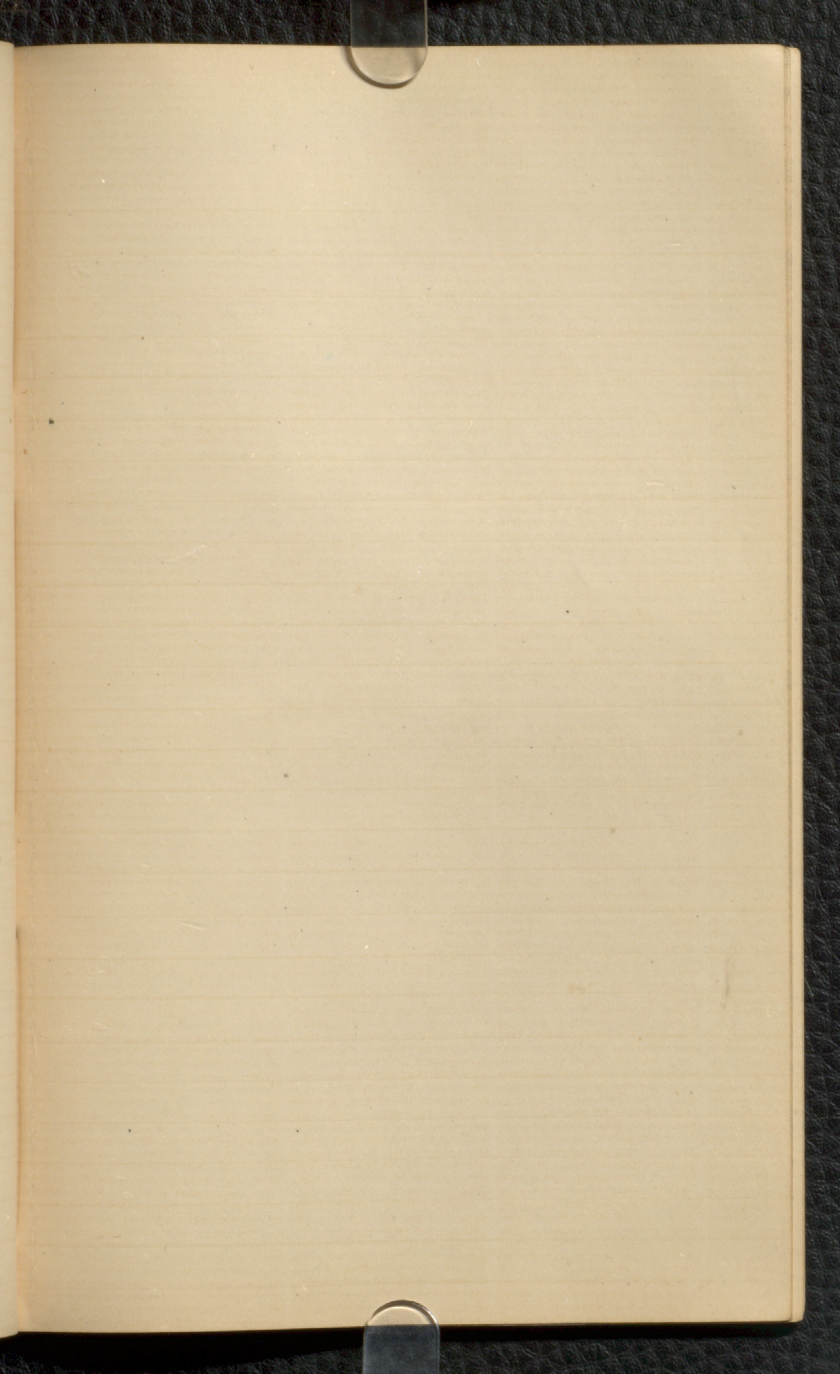


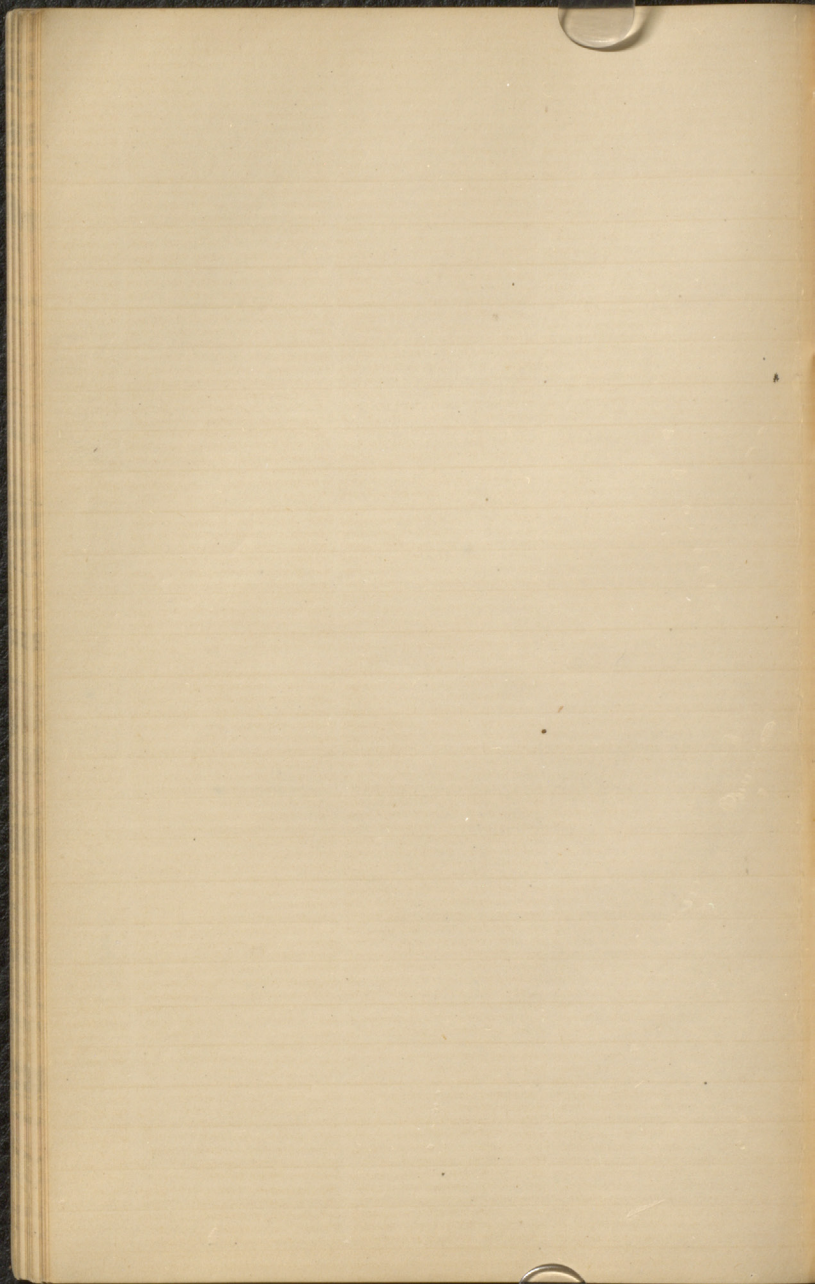


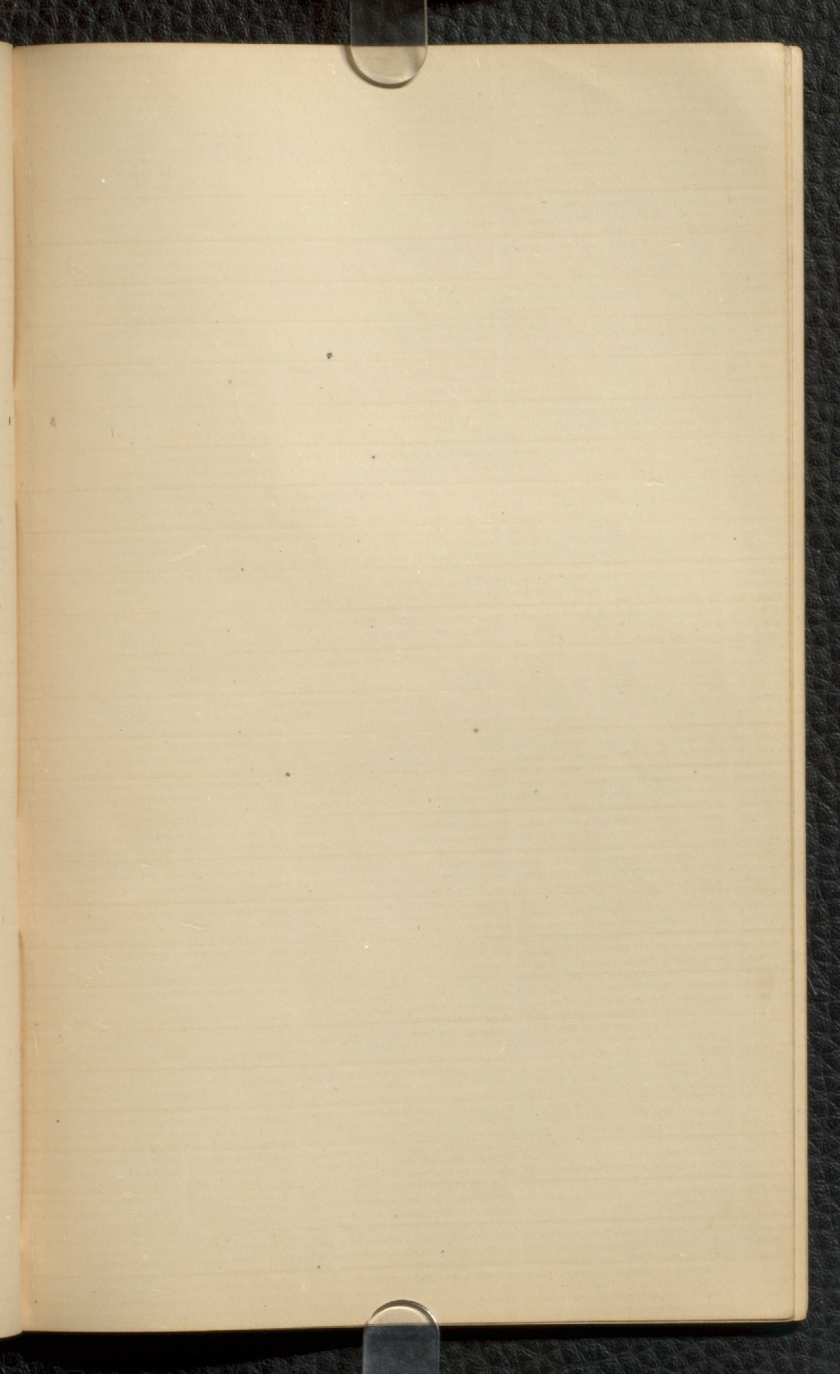


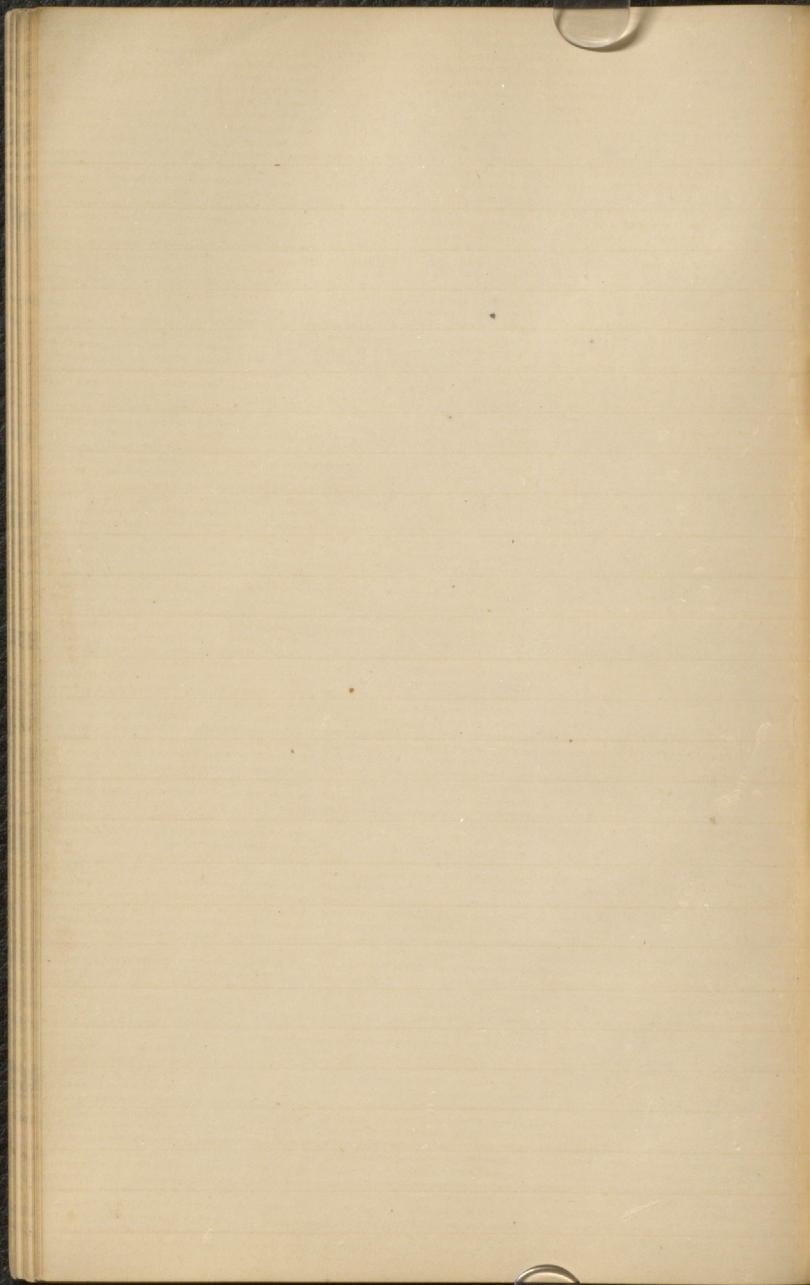


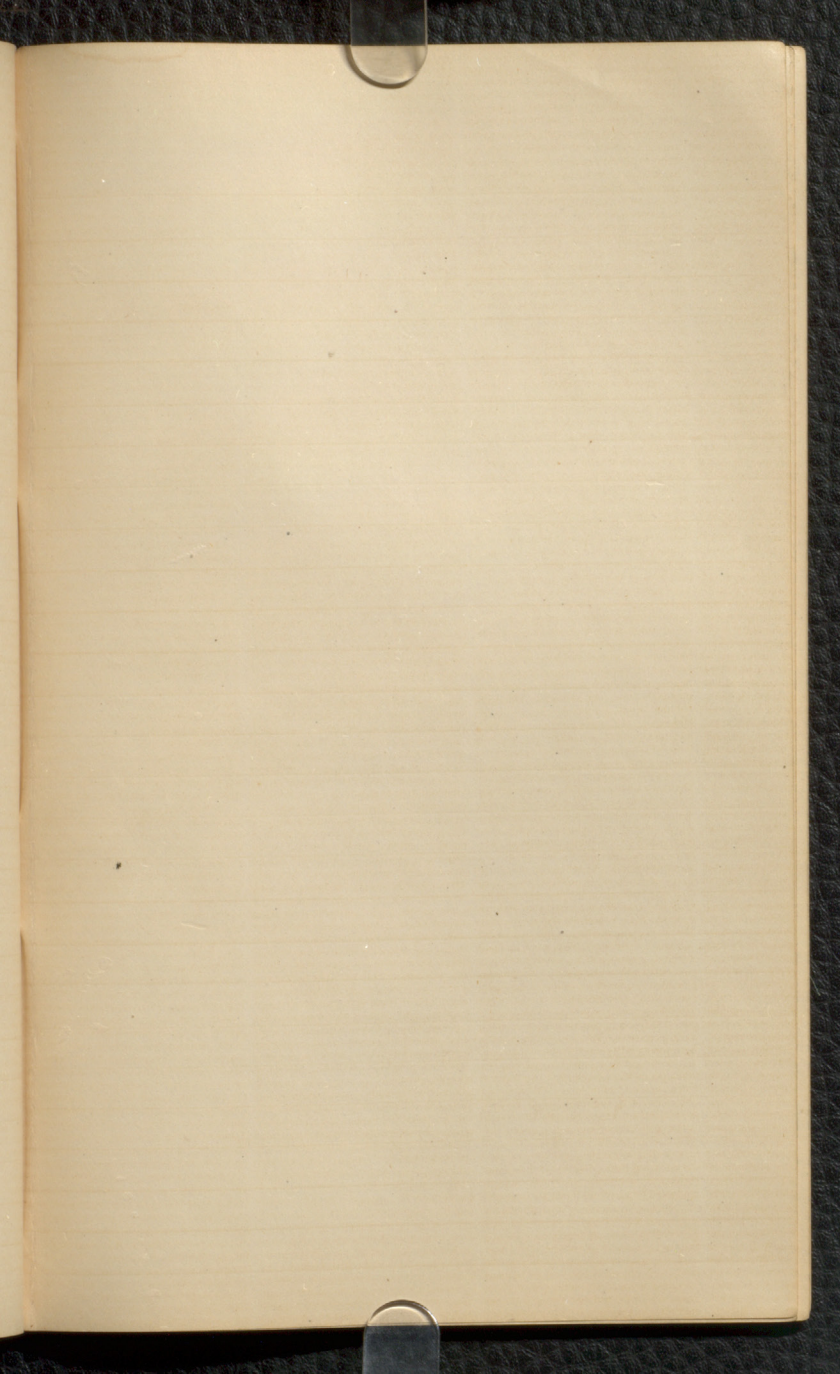


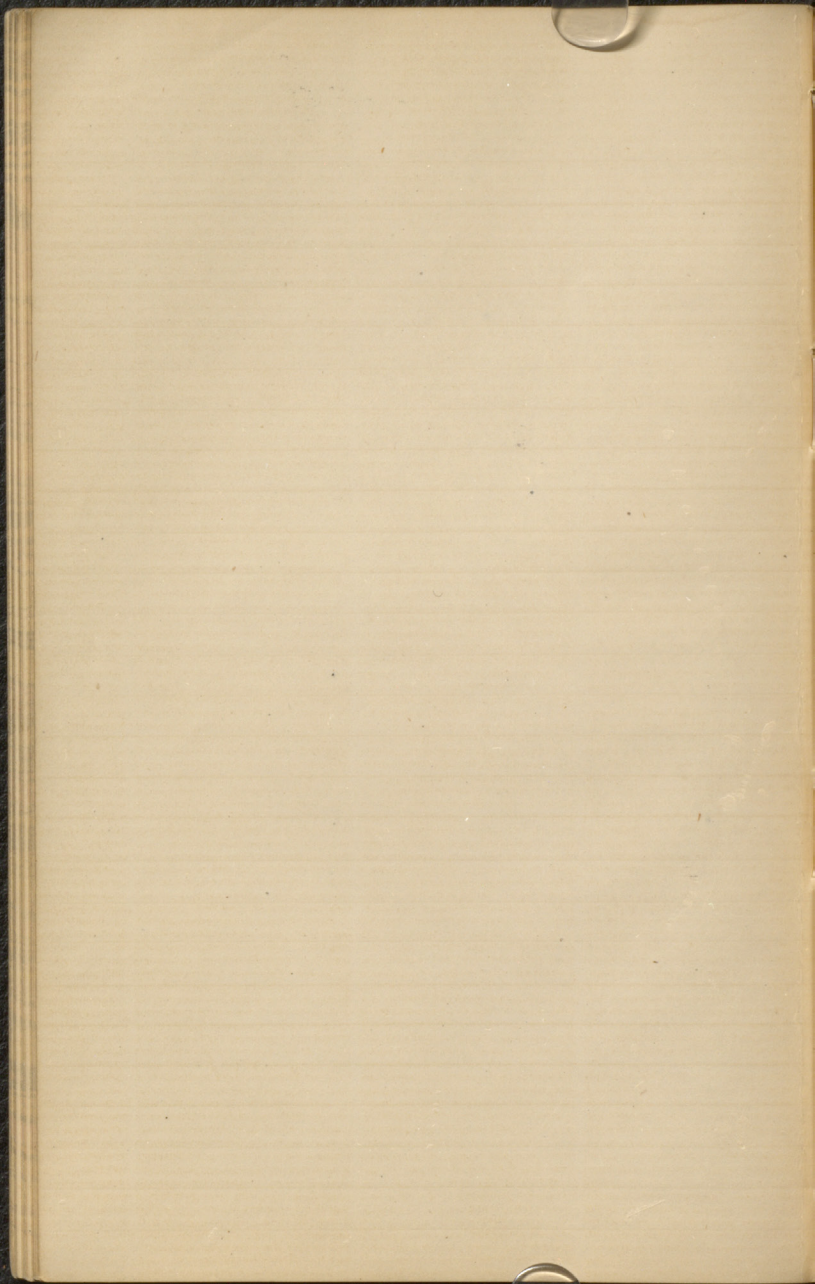


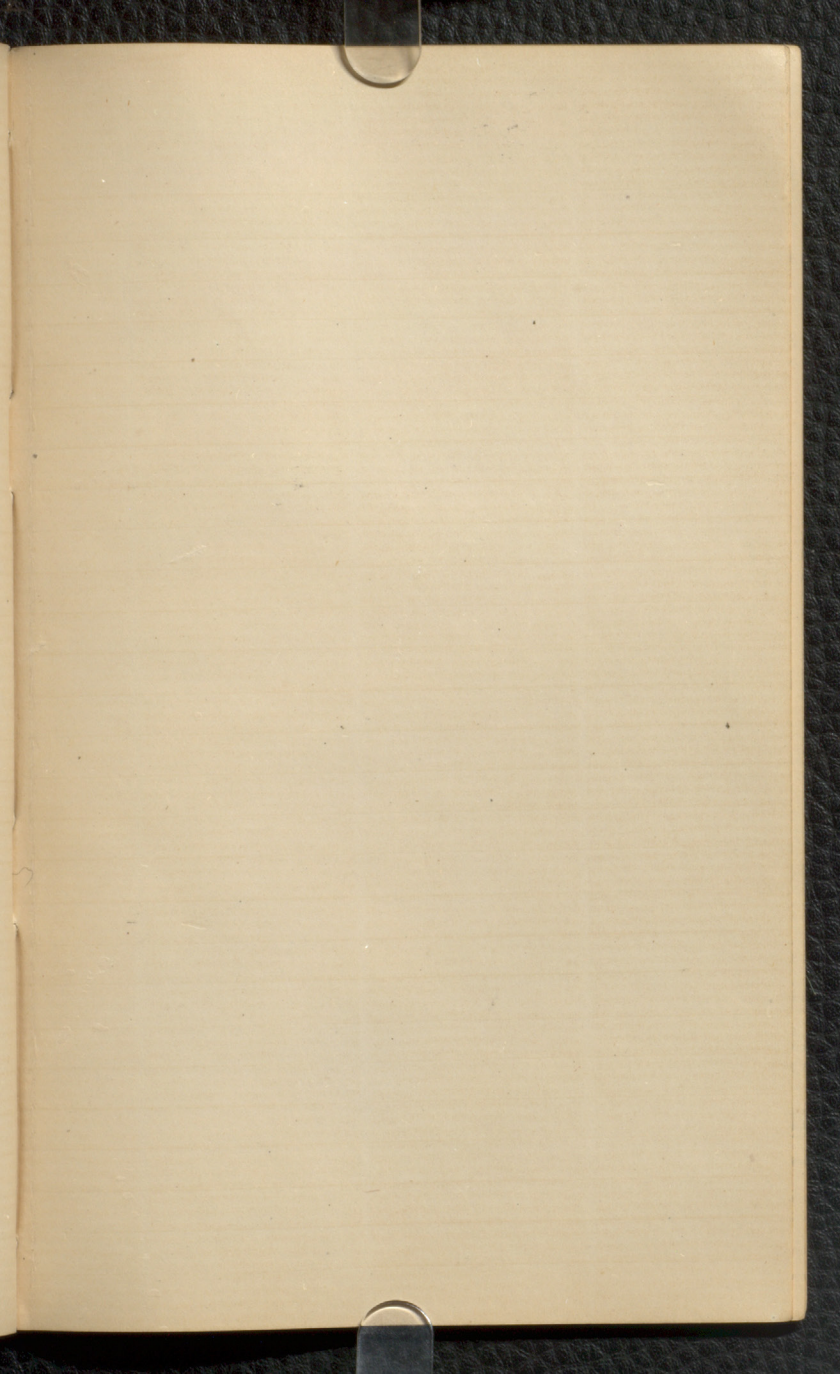


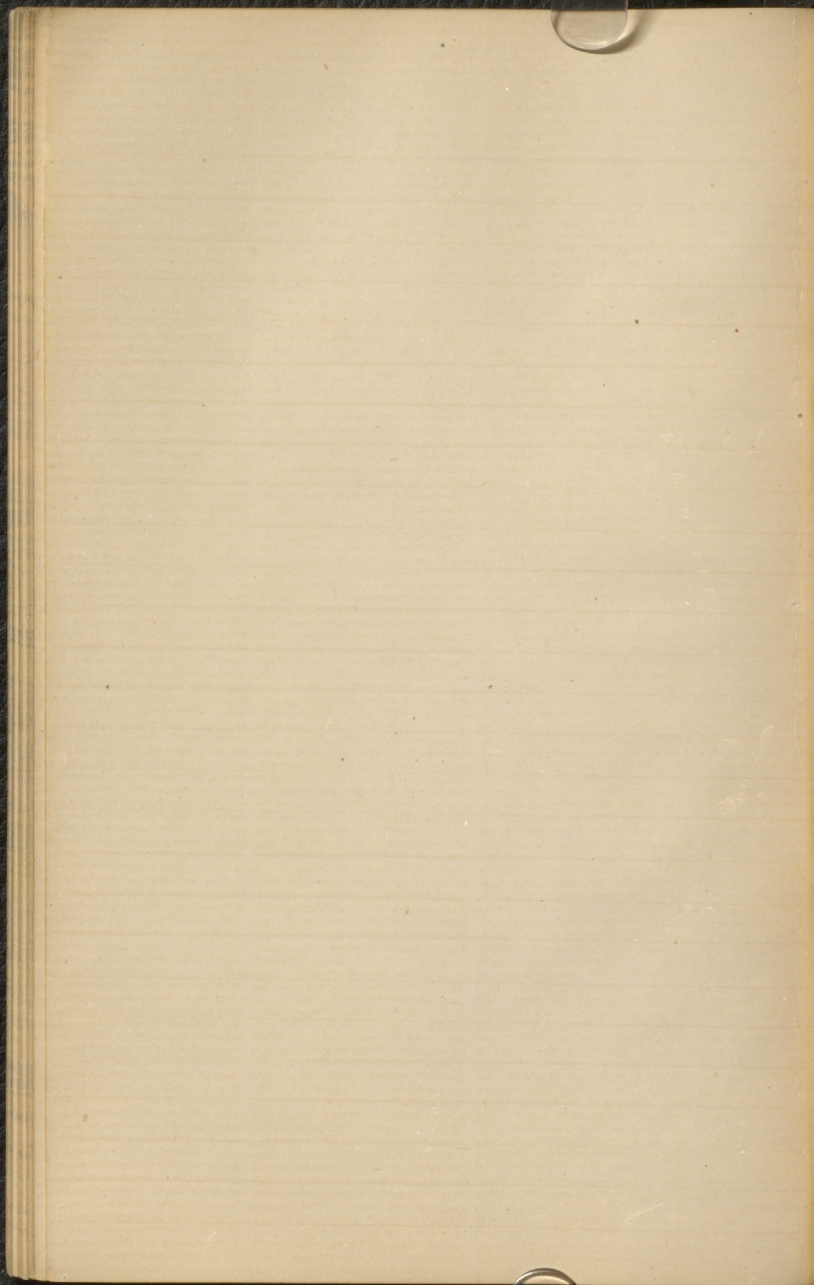


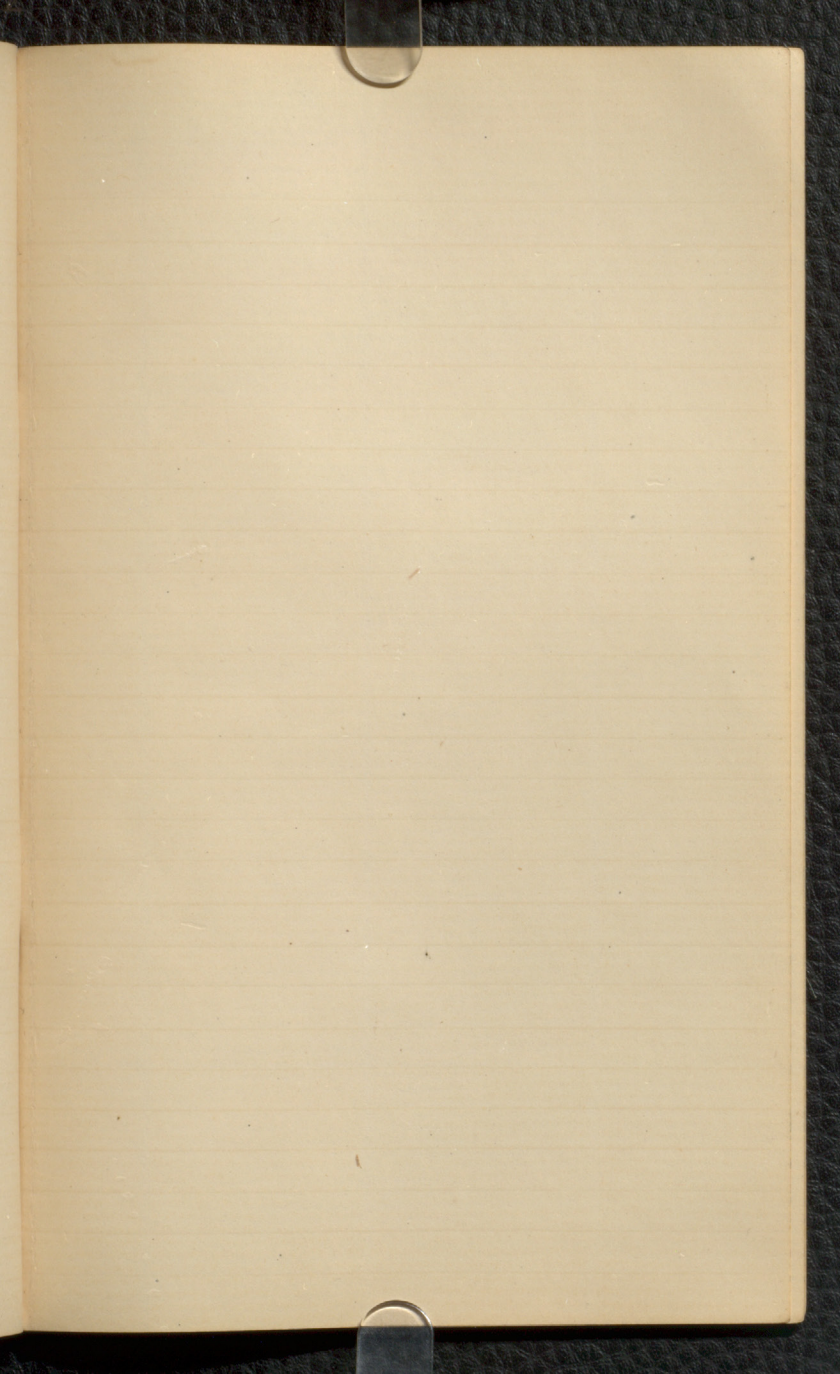


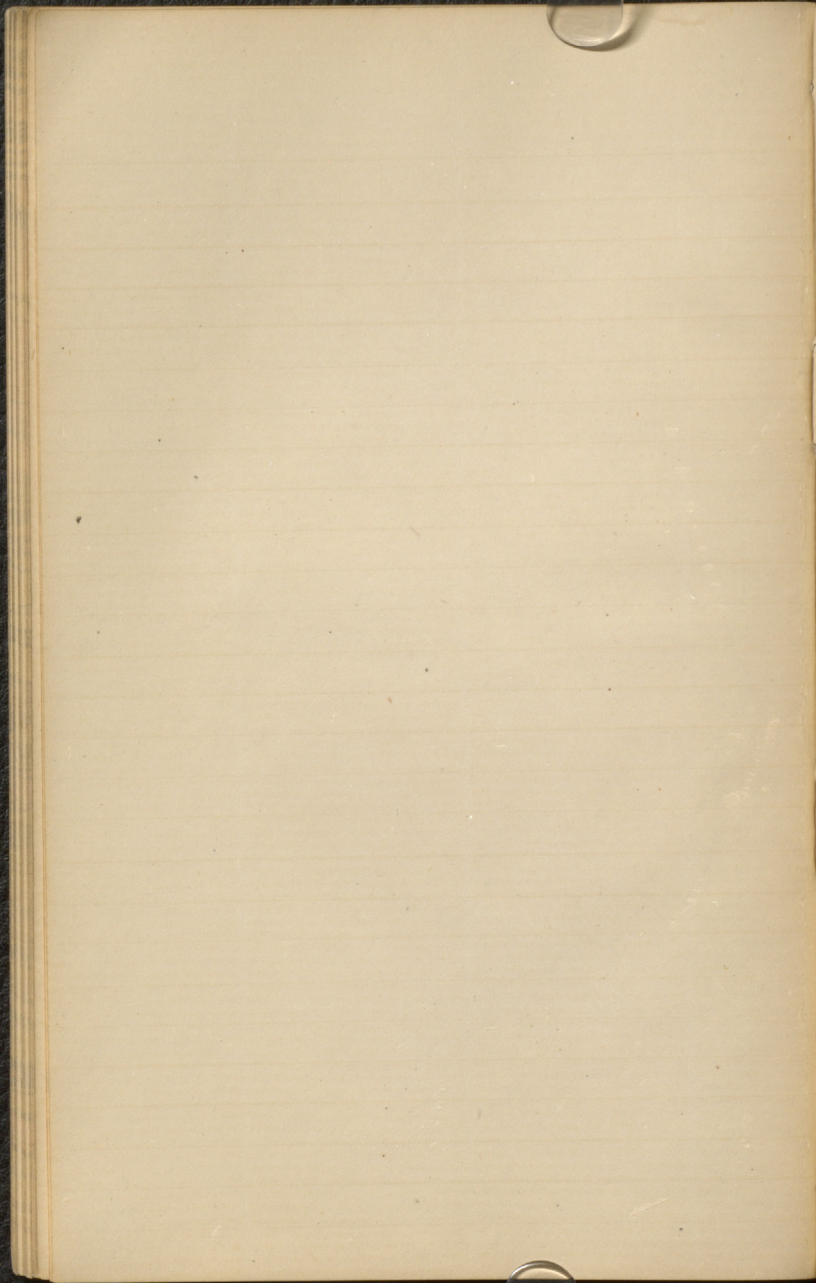


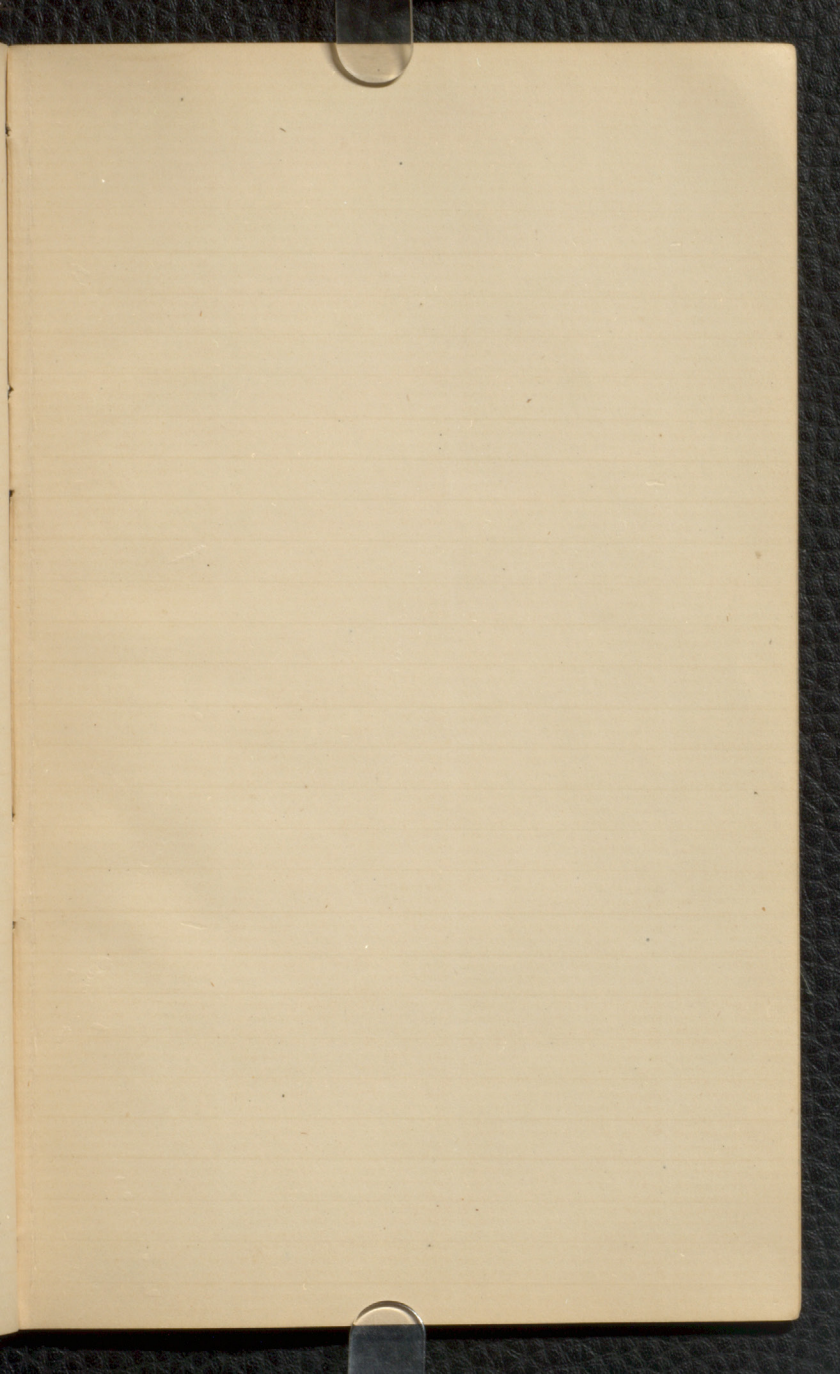


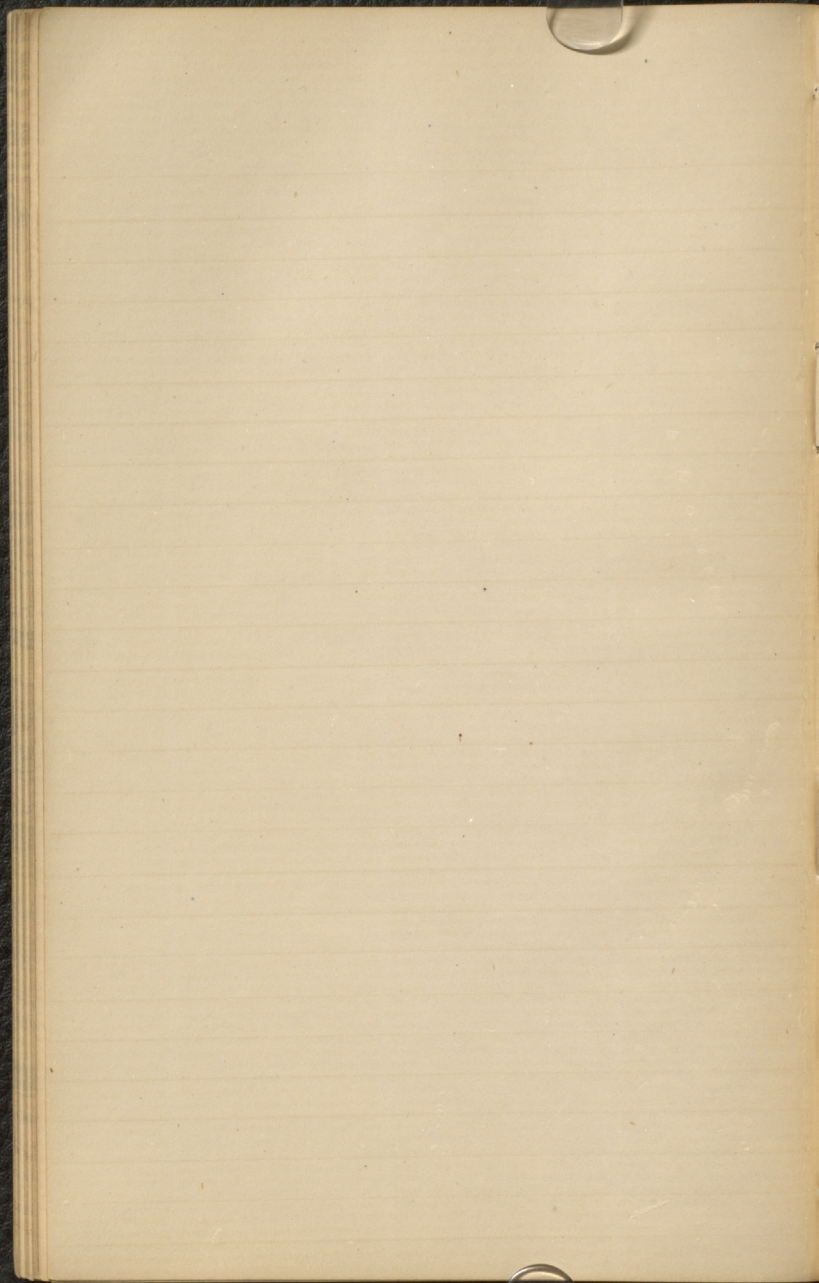


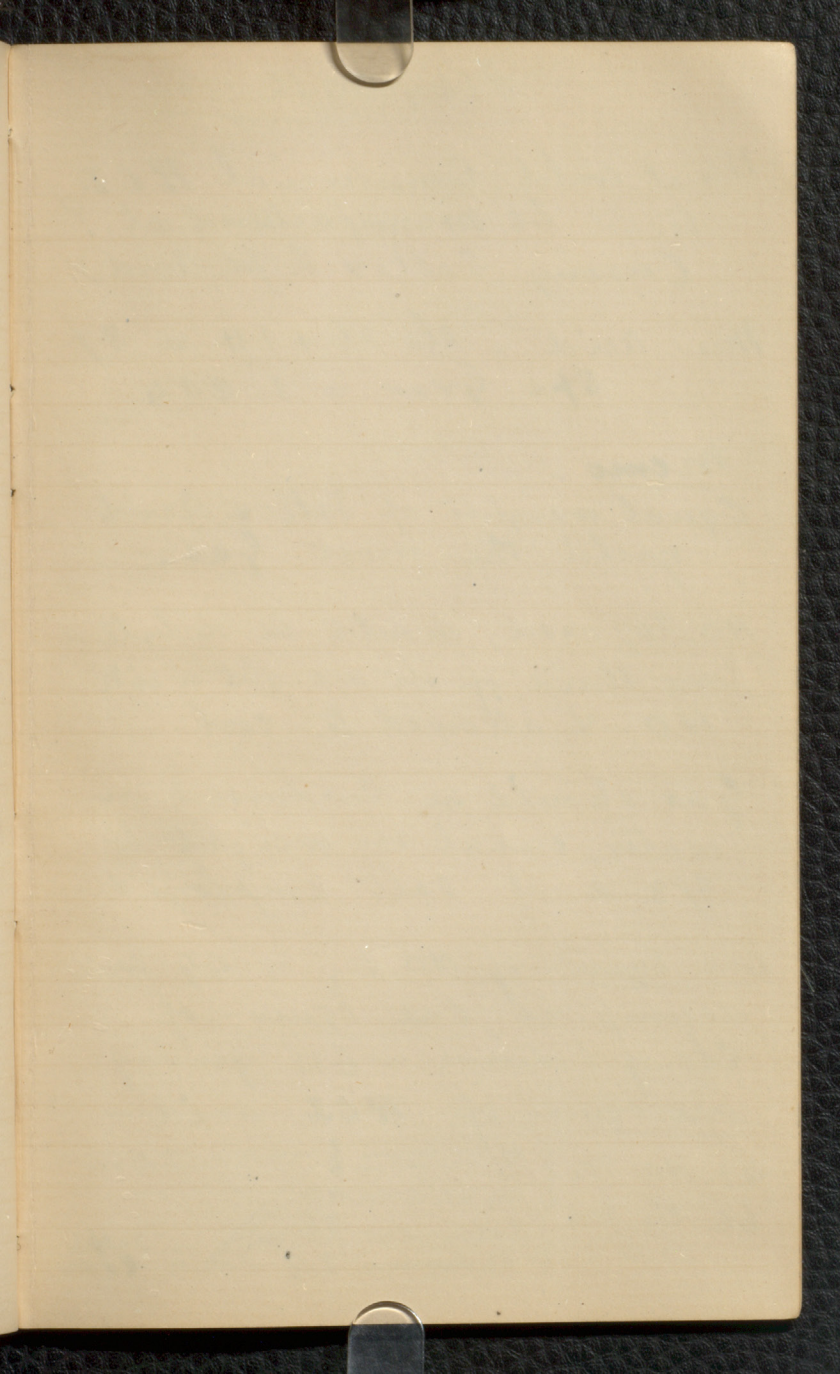


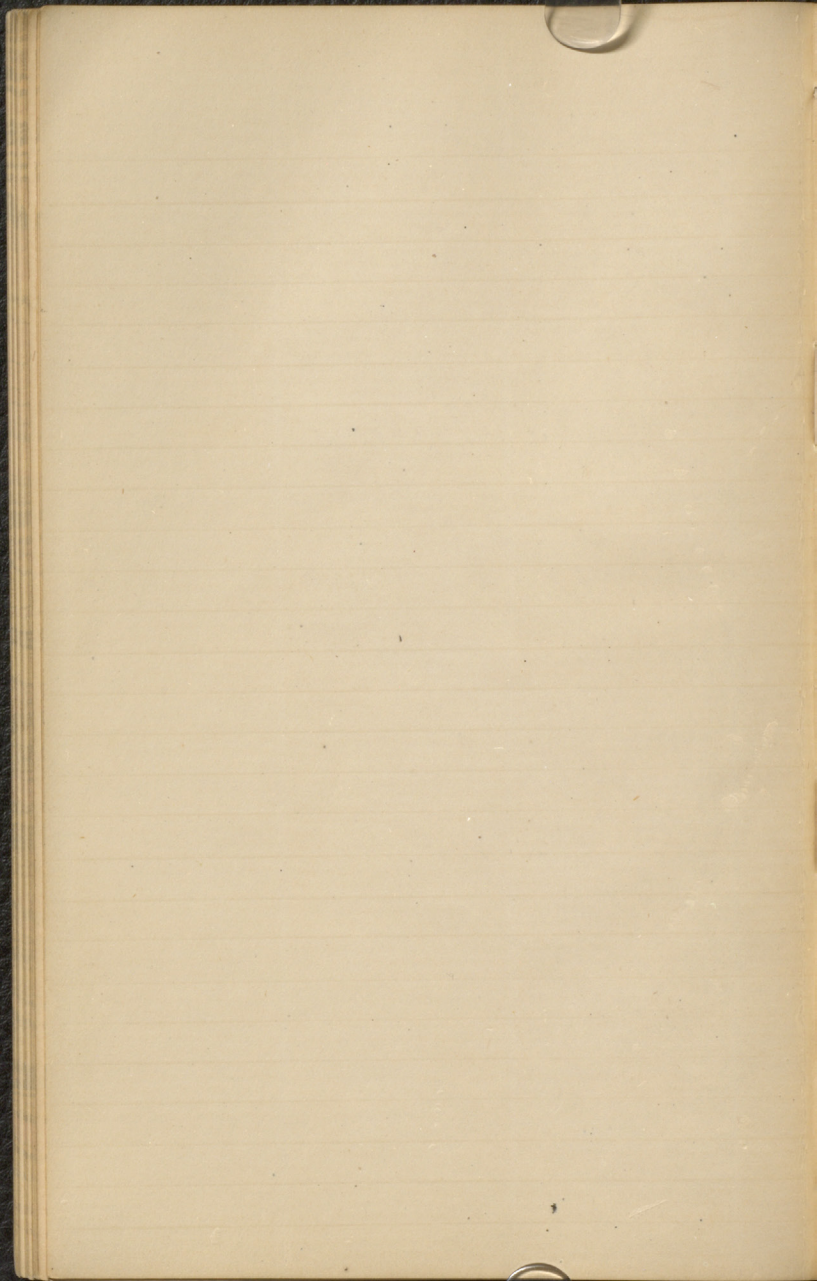












Sept 10th 1888

1/2 at each of 1000000 of HCl
Basic for manufacture of?
(using salt & sulphuric acid)

$$\text{HCl. acid} = 20 + 11 = 31$$
$$2\text{H. iron} = 1.234$$

Mr. Case

Equal weights of salt & acid
yield the most gas.

H₂O, used, should be distilled
one third of its weight in the
H₂O. & allowed to cool.

Gas should be conducted in
water, equal in weight to
2/3 of salt employed.

One grain of H₂O = 49 mill
displacement one grain of
salt of sodium = 60 grains
one grain of HCl acid

49. H ₂ O	}	100
60. Salt		100
38. Volume		38
24. Sodium		24

Feb 30th 1866

What could Commercial HCl.
Acid be manufactured at?
(using Salt & Sulph Acid)

Mu. acid = clo 36 + 1H = 37
Spe. Grav = 1.234

Memo -

Equal weights of Salt & Acid
yield the most Gas.

HO. SO₃ used, should be diluted
one third of its weight with
H₂O. & allowed to cool.

Gas should be Condensed in
water, equal in weight to
2/3 d. of salt employed -

One Equiv. of HO. SO₃ = 49 will
decompose one equiv. of
Clo. of Sodium = 60 giving
one equiv. of HCl acid -

49. HO. SO ₃	{	H	1	-----	37 HCl
		O	8	-----	
		dry acid	40	-----	
60. Clo. Sod	{	Chlorine	36	-----	
		Sodium	24	-----	72 Sulph. Soda

49
60

116

What could Commercial H₂O₂
be manufactured at
Canning, I think Sulphuric acid

the acid is about 1.14 in 100
Sp. Grav = 1.224

Means
Equal weight of salt & acid
yields the most gas.

100.00 acid, should be diluted
one third of its weight with
H₂O. I should think

gas should be introduced in
water, equal in weight to
1/2 lb. of salt employed.

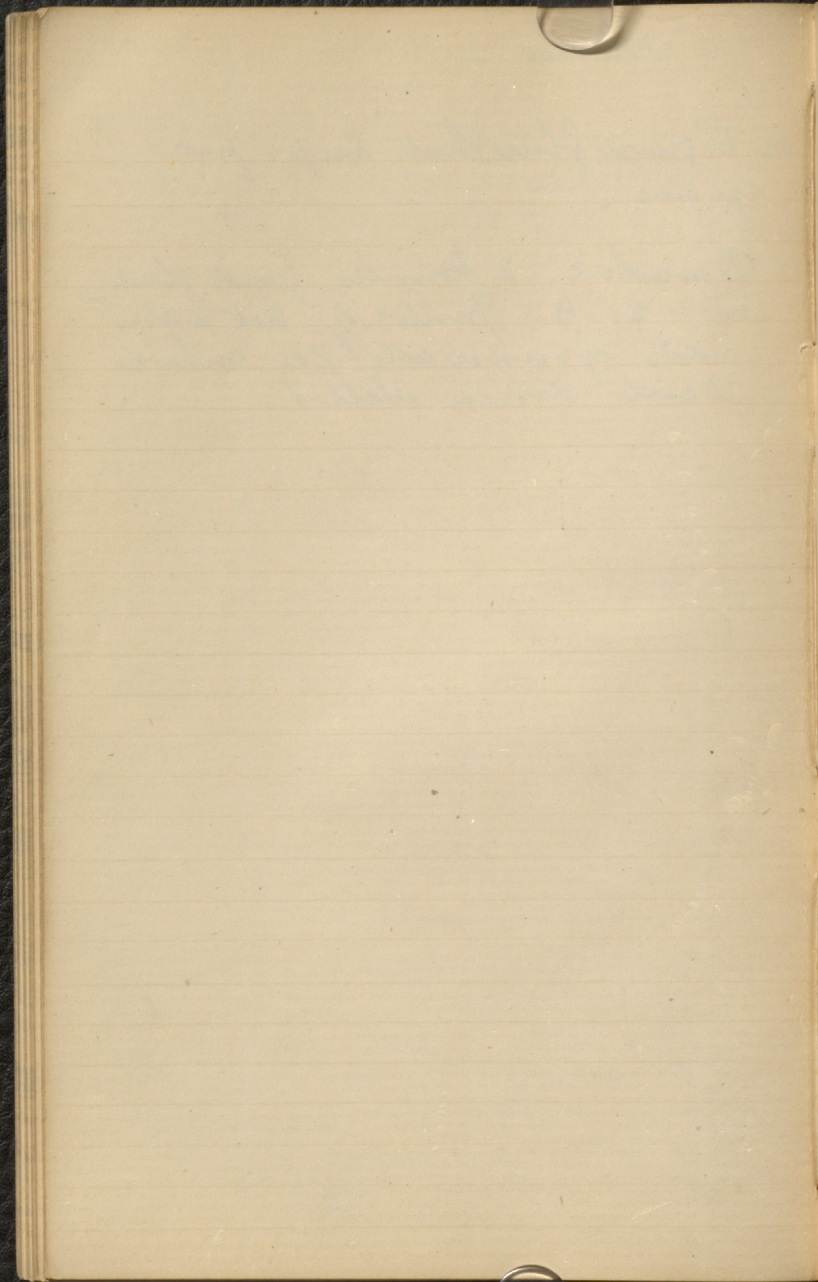
One lb. of H₂O₂ is 1.04 times
denser than one lb. of
H₂O. I think a 60 gal. tank

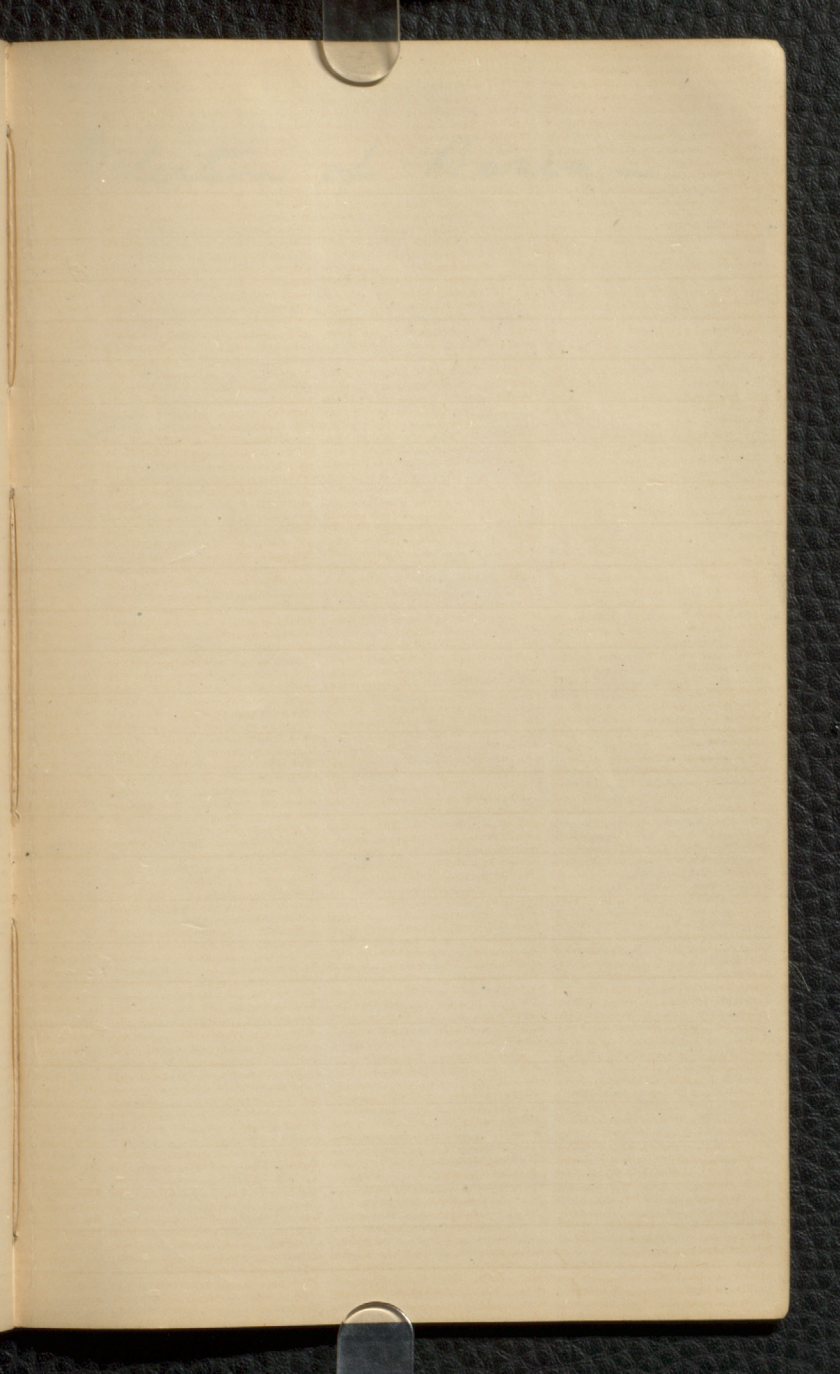
will hold 116 lb. of H₂O₂
at 60° F. I think a 60 gal. tank
will hold 116 lb. of H₂O₂

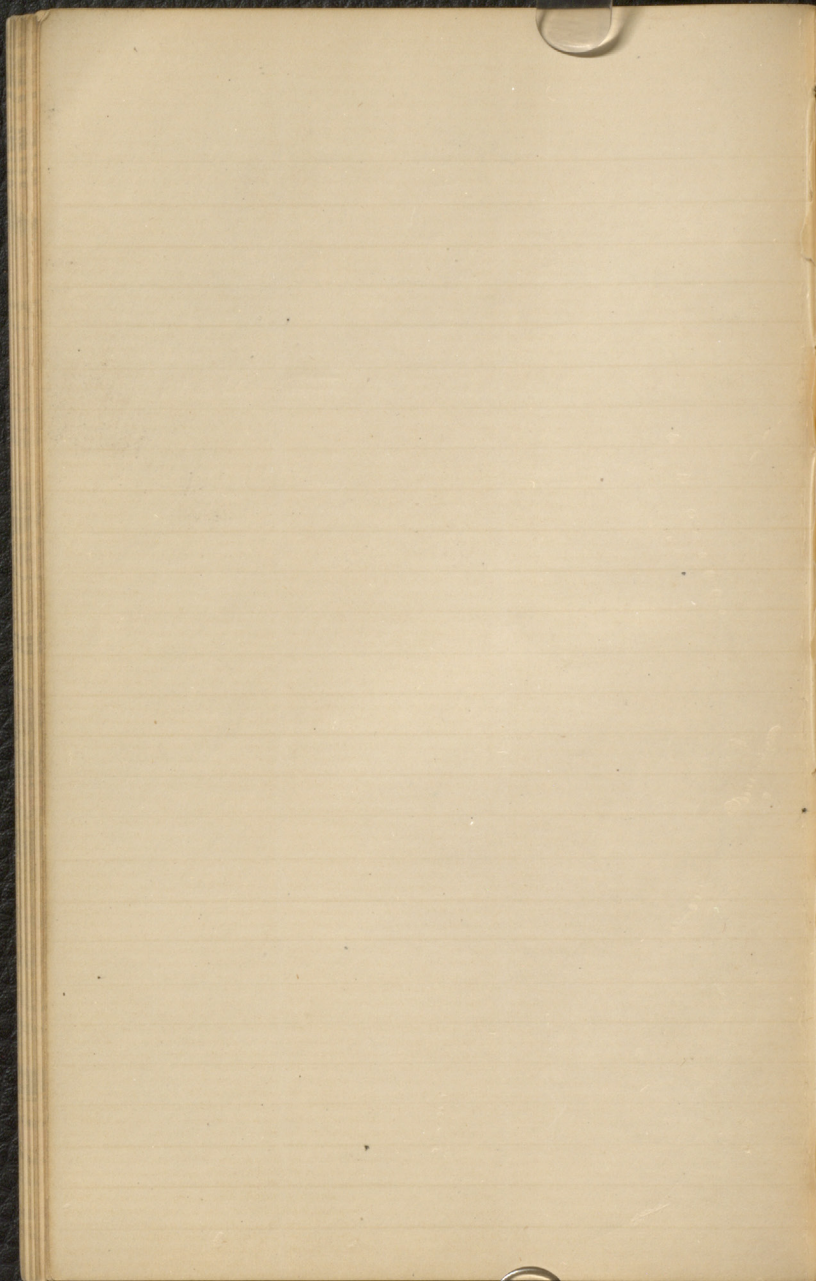
Memo -

a liquid glue that keeps for years.

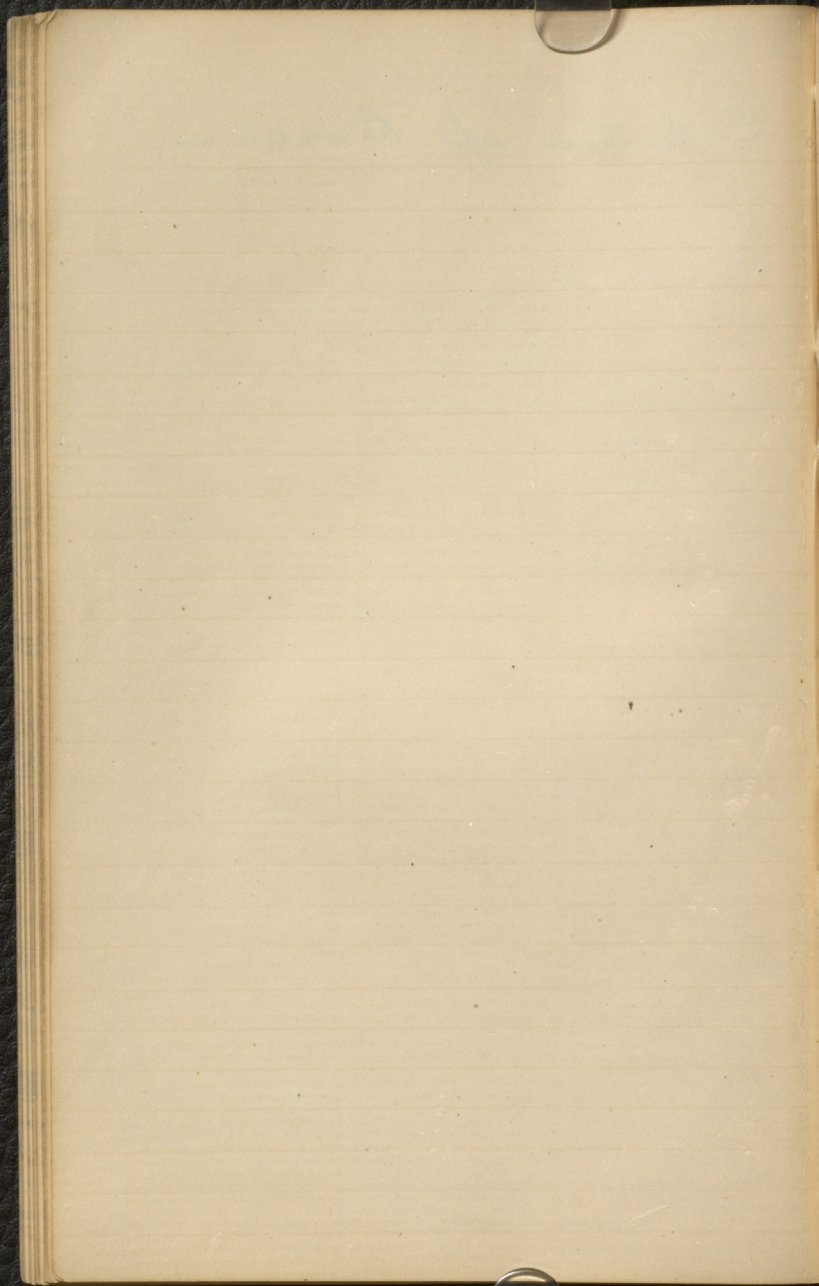
Dissolve 2 pounds good glue
in 21.9 parts of hot water
add gradually 7oz nitric
acid stir well.

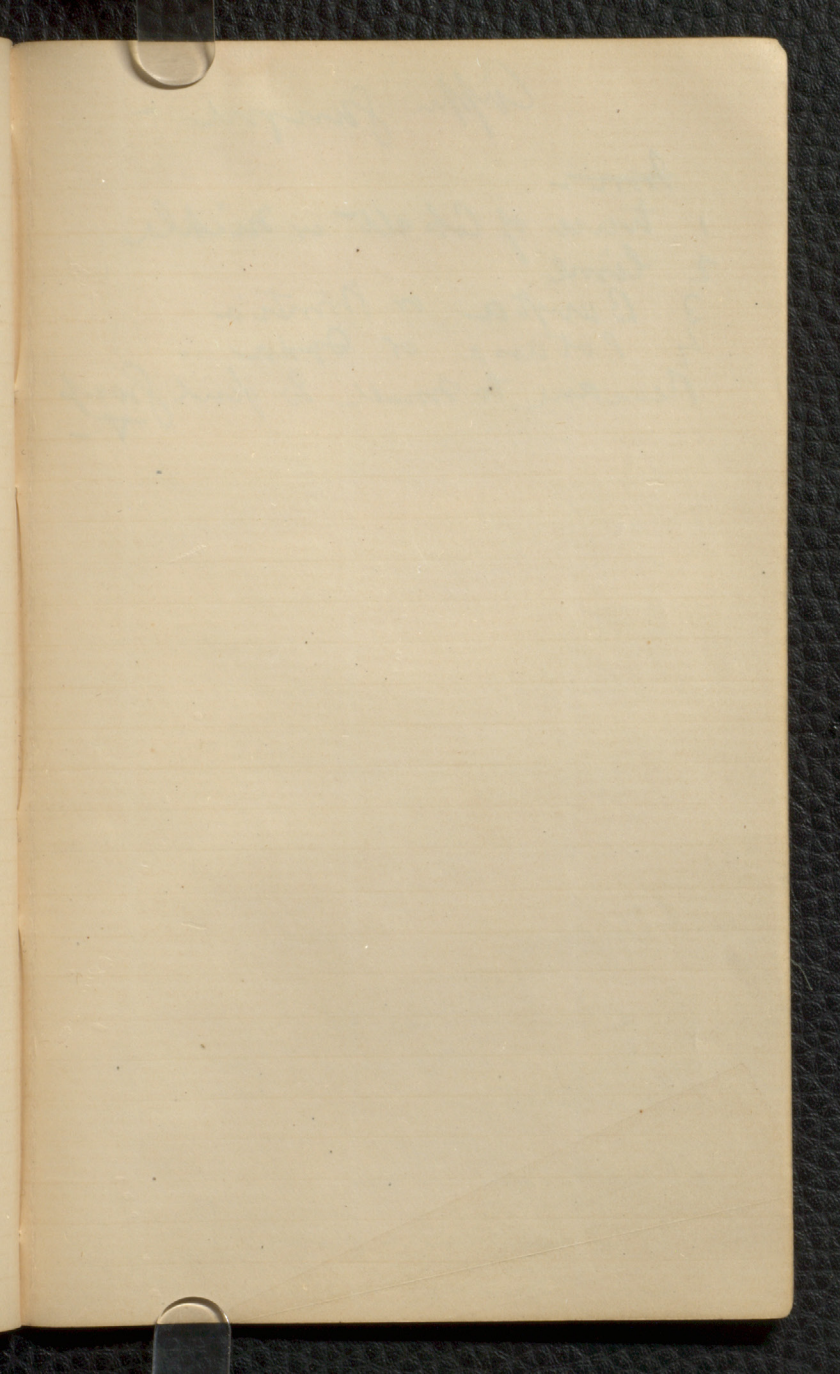






Detection of Bases -





Copper sulphate -

Am -

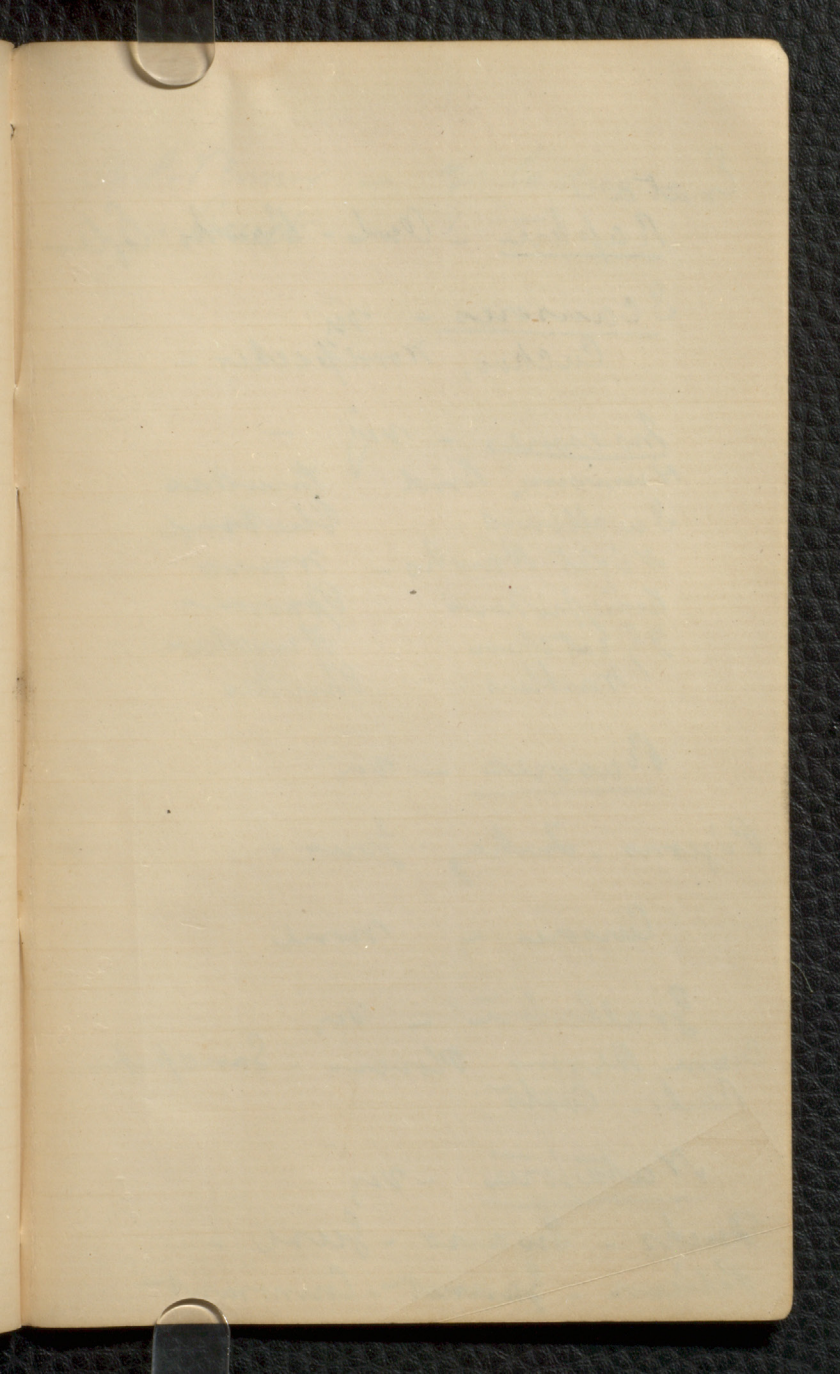
1 trace of Cobalt or Nickel

2 lime

3 Barite or Strontia

4 Potassa or Soda -

Residue to small to find group
-



Erata -

Raptures - Owls - Hawks Eagle

Scansores - vis
Cuckoo, Woodpecker -

Insesores - vis -

Humming Bird Thrushes

Swallows Bluebird

Night Hawks - Wrens

Kingfishers Sparrows

Flycatchers Finches

Warblers - Thrushes

Passores - vis

Pigeons - Turkey - Pous -

Crows - none

Grallatoris - vis

Cran. Herons Plover - Sandpiper

Reed - Coots

Natales - vis

Ducks - Swans - Geese -

Pelican - Gannet - Cormorant

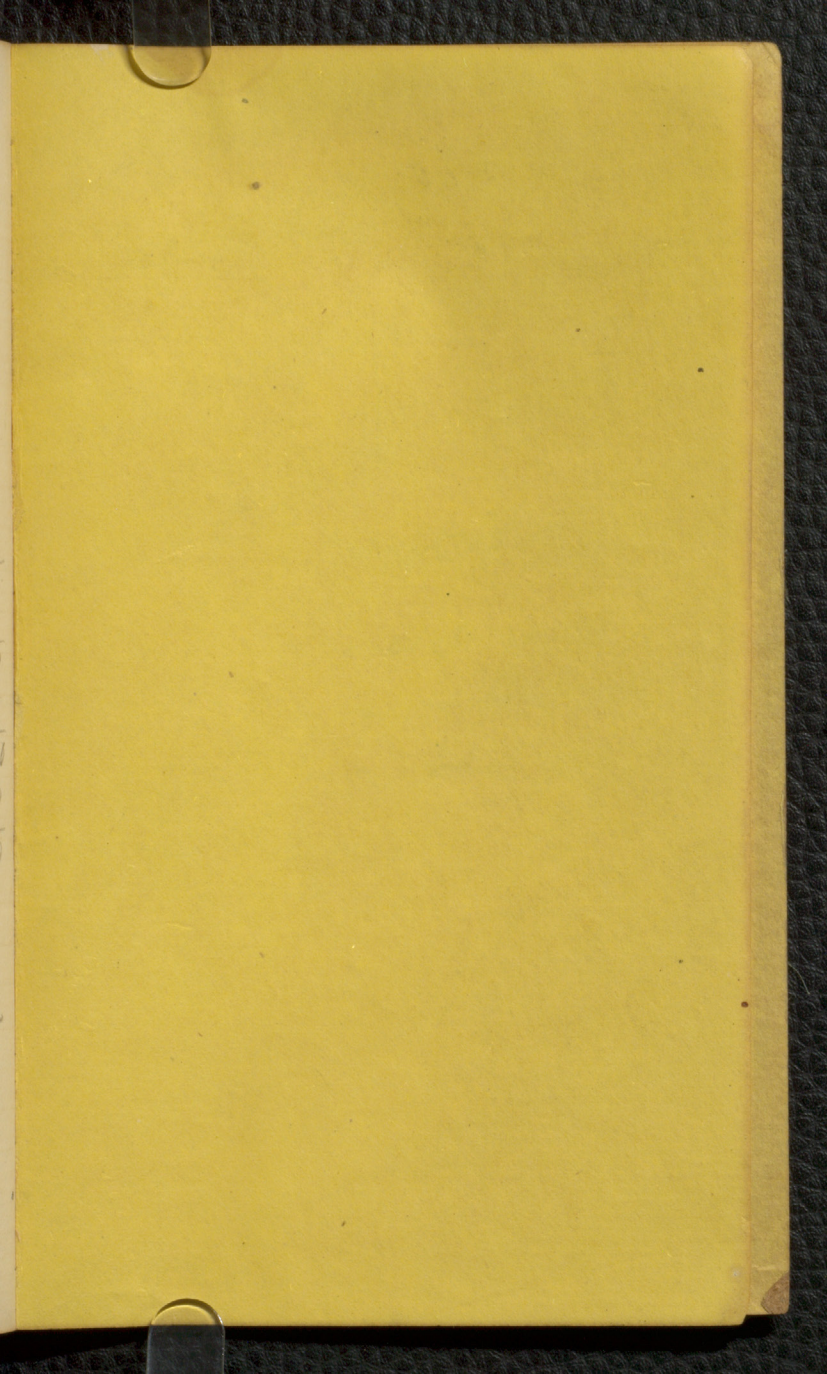
A.P. Tennor - 2 Ladris -
" " Court - 1 Ea

Geology of Canada	5.00
Canada Mineralogy	1.25
Assay of metals	2.00
Canadian Agriculture	50
Churches Chemistry	75-

100.00
40.00
<hr/>
140.00

\$ 9.50
8.00
<hr/>
17.50
6.00
<hr/>
\$ 23.50
2.00
<hr/>
25.50
10.00
<hr/>
35.50
31.00
<hr/>
66.50
38.00
<hr/>
\$ 104.50

W. Estlin
 361 - St Lawrence Min. Bldg




17

7/100
14

H


$$\begin{array}{r}
 2\frac{1}{2} \text{ down} = 150. \\
 3 \text{ scraps} = 60 \\
 9 \text{ gm} = 9 \\
 \hline
 219 \\
 - 60 \\
 \hline
 159
 \end{array}$$



$$\begin{array}{r}
 120 \\
 30 \\
 \hline
 150
 \end{array}$$

219 - weight of Perony -

- 222 = wgt water -
- 22 = " lather out -
- 69 = total weight



$$\begin{array}{r}
 219 \\
 \hline
 288
 \end{array}$$

