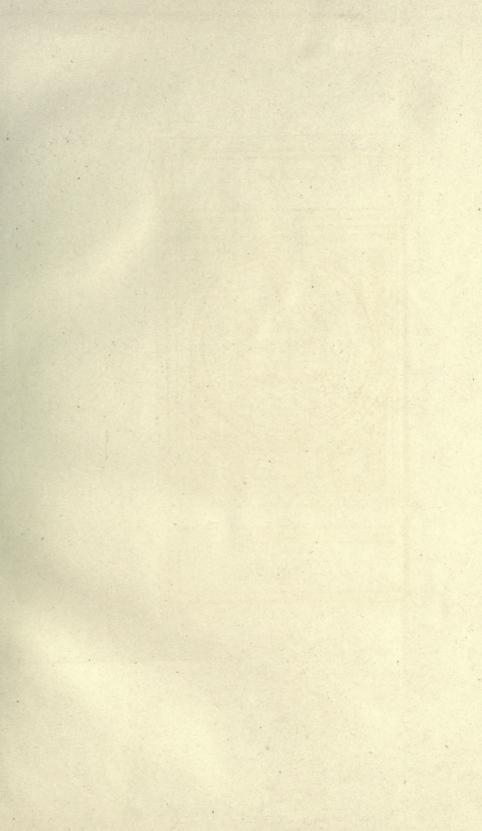


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Walter A. English

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## THE FERNANDO FORMATION NEAR NEWHALL, CALIFORNIA

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Atheling Walter A. English

Chione fernandoensis, new sp.

Picus modiforus, Gabb.

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by Walter A. English Carry Walter A. English

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Gyrineum ellsmerensis, new sp. and Shave Walley

Cancellaria ellsmerensis, new sp.

Cancellaria tritonidae, Gabb, var.angulata, new var.

Turris ellsmerensis, new sp.

Turris fernandoensis, new sp.

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Walter A. Rogitsh

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#### INTRODUCTION

The age of certain fossiliferous sandstones overlying the granite in Ellsmere Canyon, near the San Fernando Pass, has been in doubt for some years. They have been determined at different times as Vaqueros. Monterey, and Fernando. It was with the hope of obtaining additional information on the age and relationships of these beds that the writer undertook a study of them. This subject was suggested for investigation by Doctor J. C. Merriam, and the work has been carried out under his direction. The writer's field work was done during parts of the months of January and June, 1912. as of the same age as the Location.

The work done by the writer was limited to an area around Ellsmere Canyon, near Newhall, California, about thirty miles northwest of Los Angeles on the line of the Southern Pacific Railroad. Ellsmere Canyon lies on the extreme northwest flank of the San Gabriel Range, just east of the San Fernando Pass, which separates the San Gabriel from its westward continuation in the Santa Susan Range. The canyon is about three miles long, and runs in a northwest direction toward Ellsmere Ridge, at which point it enters a broad southwest extension of the broad alluvium floored Santa Clara Valley. The general elevation of the Santa Clara Valley is about twelve hundred feet, while the highest point in the San Gabriel Range of this immediate area is thirty five hundred feet.

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George H. Ashley who visited the locality of the San Fernando lashley, G.H., The Neocene Stratigraphy of the Santa Cruz Mts. Proc. Cal. Acad. of Sci., Ser. 2, vol. 5, p. 337, 1895.

Pass in 1894, says of this region: "At the San Fernando tunnel in Los Angeles county the beds that have been considered as Niocene of the Monterey Series are overlaid conformably by a series of calcareous sandstones and conglomerates which are quite fossiliferous." He made a collection of twenty three determined species, of which fourteen, or sixty per cent. are living. He considered the formation as of the same age as the Lower Purissima.

In 1900 Ellsmere Canyon was visited by W. L. Watts, who called watts, W. L., Bull. Cal. State Min. Bureau, 1900, no. 19, p. 56. the oil yielding sandstones the lower portion of the Middle Niocene. He also found a point where the sandstones of the Middle Niocene were resting unconformably on "hard sandstones resembling the Neocene sandstones of the Sespe district." This particular locality was not found by the present writer.

During the years 1901-2 the region of the Santa Clara valley was investigated by G. H. Eldridge, <sup>3</sup> who mapped the lower sandstone <sup>5</sup>Eldridge, G. H., U. S. G. S. Bull. no. 309, p. 17; 96-8. beds of Ellsmere Canyon as Vaqueros, and in the text speaks of their having a typical fauna of the Vaqueros. His age determination was, however, more probably based on the lithologic similarity to the beds in the eastern end of the Santa Susana Range, which he called Vaqueros. He speaks of a structural unconformity, with difference of dip and strike between the Fernando gravels and the underlying

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range into a southern Sierra Madre, and the main San Gabriel. He says "The Sierra Madre Range consists essentially of granodiorites and gneisses, with more acid areas in which the country rock is quartz-monzonite. The character of the rocks of the mountain area north of the Sierra Madres is considerably different from that of the latter. True biotite and rather coarse grained granodiorite, decidedly different in appearance from that of the southern range, are found in the northern mass." The west end of the San Gabriel Range is chiefly granodiorite, with gneiss and other schists.

The Fernando formation of this area is not less than three to four thousand feet thick, and was laid down upon an eroded surface of the San Gabriel Granite. The upper surface of the granite is generally somewhat decomposed. The basal ten to fifteen feet consists of subangular to rounded fragments of granite, with comminuted

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Stratigraphically above the fine sandstones and shales is a series of cross bedded alternating coarse sandstones and conglomerates. These strata are well exposed on the sides of Ellsmere Ridge, in Whitney Canyon just north of Ellsmere, in Placerita Canyon, and they extend for an unknown distance eastward along the northern flank of the San Gabriel Range. In Ellsmere Canyon the conglomerate consists of well rounded pebbles and boulders up to twelve inches in diameter of granitic, and less commonly of volcanic rocks. The pebbles are of all sizes, and grade down into the sand which fills the interspaces. The induration is slight, most samples can be broken between the fingers. The color is a light buff.

The lower sandstone and shale beds were called Vaqueros by Eldridge, and the two were considered to be structurally unconformable by him. The writer believes the entire series to be conformable. The relations of the two lithologic units are well shown on

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the ridge to the north of Ellsmere Canyon. There is here an abrupt and striking change from a medium grained sandstone to an overlying very coarse conglomerate. The conglomerate is more resistant than the underlying sandstone which weathers out from under it, and causes it to stand out very prominently on the otherwise even slope of the ridge. On examining the actual contact, the conglomerate is seen to rest on the sandstone without any irregularity of the contact plane, and the sandstone grades up into the sandy matrix of the conglomerate. Farther west the conglomerate pinches out, and the change in lithology is not so abrupt. On Ellsmere Ridge strata typical of both the upper and lower divisions are interstratified.

The conglomerate has a strike of North 50° West, and dip 12° North, while the lower part of the sandstone, and the granitic surface on which it was deposited have strike North 65° West, dip 20° North. No difference in dip or strike was observed at the actual point of contact.

Along with the difference in strike there is a thinning out of the shaly beds toward the East, and the conglomerate comes to rest directly on the granite at the head of Whitney Canyon. The presence of such an overlap does not however preclude conformity. The lithologic character of the sandstones and shales indicates that they are probably of estuarine origin, and the conglomerates are fluviatile delta deposits. In deposits of this character some irregularity is to be expected. The two different lithologic units are therefore considered to be conformable in this area.

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U.C. Loc. 1602 about hundred yards east of 1601, up small gulch in N.W. quarter S.W. quarter of sec. 8. T 3 N R 15 W

U.C. Loc. 1603 Pico canyon one quarter mile to N.W. of Superintendent's house, near tank on top of ridge.

Many of the fossil layers are only a few feet above the granite.

Small collections of some of the species were made on Ellsmere

Ridge, and in Grapevine Canyon on the south side of the San Fernando

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The following species were collected by the writer.

Of the fifty five species there are twenty three or 44 per cent.

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Arnold divides the Fernando of the Santa Clara valley into three horizons. The lower Fernando fauna as given by him comes from five different localities and consists of thirty three species, of which seventeen are specifically identified, and of the latter there are ten found also in Ellsmere Canyon. The writer examined a collection in the California Academy of Sciences from a locality five miles north-east of Camulos, which is one of the five localities mentioned above. This collection contains twenty four species, of which thirteen are common to Ellsmere Canyon, and comes from a

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From the upper Fernando he gives lists from three localities.

The first locality is north-west of Santa Paula, and is of a lower horizon than the other two; it has thirteen species which are found also at Ellsmere Canyon. The third locality is at Barlow's Ranch, and is from a Pleistocene horizon. There are only five species from the latter locality which are found also at Ellsmere Canyon.

Arnold's work in the Santa Maria district led him to believe 6Arnold, Ralph, U.S.G.S.Bull. 322 p. 58
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Pesten ashlayi Arnold Mangilia sp.?

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Pacter cerresensis Subb Massa perpinguis Hinds Neverita recluziana Petit Pacter sp.? small Pachypone biangulata? Gabb Polynices galianoi Dall

Siphonalia kelletti Portes Phacoides acutilineatus Conrad Trophon sp. ? Turitella cooperi Carpenter Phasoides nuttall Conrad

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Fauna 9 Echinoidae Phacoides richthofeni Gabb Astrodapsis fernandoensis Pack Phacoides santaecrucis Arnold Echinarachinus excentricus Esch. Solen sicarius Gould var. minor new variety Although the area of Ploo Can Tellina idae Dall Pelecypoda Venericardia californica Dall Amiantis callosa Cpr. e area is that of Eldridge. He man Casteropoda mean the centre Arca trilineata Conrad Pico anticline as Vaqueras. Amphissa sp.? mindly designed by Cardium guadrigenarium Conrad var. fernandoensis Arnold Dathytoma carpenteriana Gabb var. fernandoana Arnold Cardium sp.? Bittium cf. asperum Gabb Chione ellsmerensis new speices Calyptrae filosa Gabb Cancellaria ellsmerensis new sp. Chione fernandoensis new species Cancellaria tritonidae Gabb Cryptomya californica Conrad var. ellsmerensis new var. Cancellaria sp.? near fernandoensis Dosinea ponderosa Gray Leda taphria Dall chocolad and Arnolded and allowed Macoma indentata Cpr. Chrysodomus arnoldi Rivers Macoma sp.? Chrysodomus sp.? Conus californicus Hinds Marcia subdiaphana Cpr. Metis alta Conrad Crepidula princeps Conrad Modiclus rectus Conrad Cypraea fernandoensis Arnold Mytilus sp.? Drillia fernandoensis new sp. Nucula castrensis Hinds Ficus nodiferus Gabb Panopea generosa Gould Gyrineum ellsmerensis new sp. Pecten ashleyi Arnold Mangilia sp.? Mitra idae Dall Pecten healyi Arnold Pecten cerrosensis Gabb Nassa perpinguis Hinds Neverita recluziana Petit Pachypoma biangulata? Gabb Pecten sp.? small Polynices galianoi Dall Siphonalia kelletti Forbes Phacoides acutilineatus Conrad Trophon sp.? Phacoides nuttali Conrad Turitella cooperi Carpenter Turris fernandoensis new sp.

Rohinoidae

Astrodapsis fernandoensis Pack

Echinarachinus excentricus Esch. var. minor new variety

Pelecypoda

Amiantis callosa Cpr.

Arca trilineata Conrad

Cardium quadrigenarium Conrad

Chione ellamerensis new speices .Calyptrae filosa Gabb

Chione fernandoensis new species Cancellaria ellamerensis new sp.

Cryptomya californica Conrad Cancellaria tritonidae Gabb

Leds taphria Dall

Macoma sp.?

Marcia subdiaphana Cpr. Conus californicus Hinds

Metis alta Conrad

Modicius rectus Conrad

Mucula castrenets Hinds

Panopea generosa Gould

Pecten ashleyi Arnold

Pecten healyi Arnold

Pecten cerrosensis Gabb

Pecten sp.? small

Phacoides acutilineatus Conrad

Phacoides richthofeni Gabb

Phacoides santaecrucis Arnold

Solen sicarius Gould

Tellina idae Dall

Venericardia californica Dall

Casteropeda

Amphissa sp.?

var. fernandoensis Arnold Dathytoma carpenteriana Gabb var. fernandoana Arnold Cardium sp.? Bittium of. asperum Gabb

var. ellemerensis new var. Dosinea ponderosa Gray Cancellaria sp. ? near fernandoen

Arnold

Macoma indentata Cpr. Chrysodomus arnoldi Rivers

Chrysodomus sp.?

Crepidula princeps Conrad Cypraea fernandoensis Arnold

Mytilus sp.? Drillia fernandoensis new sp.

Ficus nodiferus Gabb

Gyrineum ellamerensis new sp.

Mangilla sp.?

Mitra idae Dall

Wassa perpinguis Hinds Meverita recluziana Petit Pachypoma biangulata? Gabb Polynices galianoi Dall Stphonalia kelletti Forbes Trophon sp.? retreamen tremman effettmin

Ellement Canyon, where the sem Introduction. To sail if erous. The two

Although the area of Pico Canyon was one of the first oil producing localities in the state, the only account of the geology of the area is that of Eldridge. He mapped the beds near the centre of the Pico anticline as Vaqueros, which was seemingly conformably overlain by Fernando gravels. From a hasty examination of the Santa Susana mountains from Pico canyon to San Fernando pass the writer has come to the conclusion that the beds which form the axis of the Pico anticline are part of the Fernando series, and are not Vaqueros.

Stratigraphy.

Lithologically the strata is the axis of the Pico anticline are fine grained, chocolate colored, oil stained and slightly indurated sandstones and sandy shales, which have in places been affected by pressure so as to become spheroidal and jointed. These beds are only 400 or 500 feet thick, above which the finer beds are interstratified with gravels and conglomerates, which latter become gradually more abundant, until about 2500 feet above where they first appeared the coarse beds entirely replace the fine sandy shales and sandstones.

On the north limb of the anticline the beds dip to the north at angles of from 20° to 70°, the steeper dips being near the axis of the anticline and the lesser ones at the edge of the valley. At no place was any structural evidence of uncomformity found, although the section is well exposed, due to the steep slopes, and the absence of vegetation.

Pico Canyon Area.

.nottoduotton.

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of vegetation.

The lithologic succession is the same in Pico Canyon as in Ellsmere Canyon, where the sandy shales are fossiliferous. The two areas are only a few miles apart, and the beds can be traced as practically continuous between the two areas. It is thus very probable that the Pico Canyon sandy shales are of the same age as those in Ellsmere Canyon, and are of Fernando and not Vaqueros age.

Similar in general to the recent Bohingrachinus The following collection was made from a fine grained sandstone rom which it differs as follows: -- size smaller, interstratified with gravels, near the upper limit of the fine test thinner; tumid area in center of abactinal surface grained beds ent, the thickness decreasing gradually from the center to

Pelecypoda

edges which are very thin; excentricity of apical system Cardium quadrigenarium Conrad wies from 1:1 to 1:2.4 and averages 1:2.0, which is

Cardium, sp.?

Chione fernandoensis, new sp. respect the present form is somewhat similar to E. gibbsi.

Leda taphria Dall

ch, however, is more excentric, and which has the relative Pecten sp.? like pabloensis

trious. Specimens similar to

sity of California collection

Solen sicarius Gould

Gasteropoda

Bulla, sp.?

Calyptraea filosa Gabb

omewhat greater than in the living E. excentricus. In this Chrysodomus arnoldi Rivens

Fusus cf. portolaensis

Nassa perpinguis Hinds

ngths, and the angles between the patals different. Neverita sp.?

This variety resembles inmature specimens of E. skeen-Polynices gallianoia Dall rasent form in the Univer-

> Sigaretus scopulosus Conrad d from Burn's Barch

Turitella cooperi Cpr.

(Senta Clora valley), and from the Tenth Street Wel. This fauna is essentially of the same age as that collected from Ellsmere canyon, although it is from beds which appear to be about 1500 feet stratigraphically above the latter horizon.

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The following collection was made from a fine grained sandst interstratified with gravels, near the upper limit of the fine grained beds

shoqorejasə

Cardium, sp. ? Calyptraea filosa Gabb

Leda taphria Dall Fusus of. portolaensis

Pecten sp.? like pabloensis | Wassa perpinguis Hinds

Solen sicarius Gould Neverita sp.?

Cardium quadrigenarium Conrad Bulla, sp.?

Chione fernandoensis, new sp. Chrysodomus arnoldi Rivens

Pelecypoda

Polynices gallianoia Dall

erest and a solution of the second of the se

Turitella cooperi Cpr.

This fauna is essentially of the same age as that collected from Ellamore canyon, although it is from beds which appear to be about 1500 feet stratigraphically above the latter horizon. Chione ellamerensis new sp.

Pl. 1, fig. 1 and 2.

12

Echinarachinus excentricus Esch. var. minor
L.010101, second cardinal new var. fid; shell ornemented
Pl. 2. fig. 7:
by concentric lamellas which disappear on eroded specimens;

excentricus from which it differs as follows:--size smaller, and test thinner; tumid area in center of abactinal surface absent, the thickness decreasing gradually from the center to the edges which are very thin; excentricity of apical system varies from 1:1 to 1:2.4 and averages 1:2.0, which is somewhat greater than in the living E. excentricus. In this respect the present form is somewhat similar to E. gibbsi, which, however, is more excentric, and which has the relative lengths, and the angles between the petals different.

This variety resembles immature specimens of E. excentricus. Specimens similar to the present form in the University of California collection are marked from Burn's Ranch (Santa Clara valley), and from the Tenth Street Well, San Diego.

mm., width 12 mm.

Echinarachinus excentricus Esch. var. minor new var.
Pl. 2. fig. 7.

Similar in general to the recent Echinarachinus excentricus from which it differs as follows: --size smaller, and test thinner; tumid area in center of abactinal surface absent, the thickness decreasing gradually from the center the edges which are very thin; excentricity of apical system varies from 1:1 to 1:2.4 and averages 1:2.0, which is somewhat greater than in the living E. excentricus. In this respect the present form is somewhat similar to E. gibbsi, which, however, is more excentric, and which has the relativients, and the angles between the petals different.

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7.4

#### Chione ellsmerensis new sp.

Pl. 1, fig. 1 and 2.

Chione fernandoensis, new sp. Shell large, outline rather rounded; dental formula Pl. 1, fig. 4 and L.010101, second cardinal tooth bifid; shell ornamented Shell small, sub-triangular, thick; lunule large, by concentric lamellae which disappear on eroded specimens; cordate, distinct, bounded by an impressed line; anterior radial sculpture of flat ribs developed by weathering; dersal slope short, posterior dersal slipe long and only escutcheon a distinct flattened area, the radial sculpture very slightly convex; escutcheon broad and flat or slightly absent from the escutcheon, and for a distance of about ten concave; ligemental channel squal in length to one third millimeters below the escutcheon; ligament deep seated; of posterior dersal slope; base roundly arcuste; shell marked lunule lanceolate, bounded by impressed line. by concentric lameliae which become more prominent upon

anteriorly, the escutcheon is narrower, and the lunule is of the same width but twice as long. It appears similar to a specimen from the lower Miocene at Calabasas, figured by Ralph Arnold as C. temblorensis, and which he says is similar to, or possibly identical with a form found in the upper Miocene.

Altitude 75 mm.; latitude 95mm., of which two thirds is posterior to the beak; diameter 45 mm.; lunule length 20 mm., width 12 mm.

lunule length 6 mm., width 4 mm.

# Chicne ellsmerensis new sp. Pl. 1, fig. 1 and 2.

Shell large, outline rather rounded; dental formula
L.010101, second cardinal tooth bifid; shell ornamented
by concentric lamellae which disappear on eroded specimens;
radial sculpture of flat ribs developed by weathering;
escutcheon a distinct flattened area, the radial sculpture
absent from the escutcheon, and for a distance of about ten
millimeters below the escutcheon; ligament deep seated;
lumule lanceclate, bounded by impressed line.

Compared to Chione securis this species is longer anteriorly, the escutcheon is narrower, and the lunule is of the same width but twice as long. It appears similar to a specimen from the lower Miocene at Calabasas, figured by Ralph Arnold as C. temblorensis, and which he says is similate, or possibly identical with a form found in the upper Miocene.

Altitude 75 mm.; latitude 95mm., of which two thirds is posterior to the beak; diameter 45 mm.; lunule length 20 mm., width 12 mm.

### Chione fernandoensis, new sp.

Figus modiforus, Gabb.

Pl. 1, fig. 4 and 5.

Shell small, sub-triangular, thick; lunule large, cordate, distinct, bounded by an impressed line; anterior lower angulation present, the former the more distinct dorsal slope short, posterior dorsal slipe long and only shell ormamented with twelve very prominent nodes to each very slightly convex; escutcheon broad and flat or slightly hase consist of two spiral rows of vertical concave; ligamental channel equal in length to one third ated nodes, the upper row being so spaced as to alterof posterior dorsal slope; base roundly arcuate; shell marked ith the lever; both the lower and upper nodes are by concentric lamellae which become more prominent upon elongated and have from one to three cusps which are formed erosion of specimen, when they give it a corrugated appearance; radially marked by numerous fine ribs. node: shell marked by toelve to fifteen spiral lines, be-

This species is common from the lower part of the Fernando formation. It was probably included under Chione succincta by Gabb, who lists the latter from the Fernando Pliocene. This species differs from other chiones by its small size, large broad lunule, lamellar structure, and broad escutcheon.

Altitude 18 mm.; length 22mm.; thickness 10.5 mm.; lunule length 6 mm., width 4 mm.

pactively; the spiral lines on F. nediferus wary in width

and show a tendency to be wavy, while those on P. kernianum

## Chione fernandoensis, new sp. Pl. 1, fig. 4 and 5.

Shell small, sub-triangular, thick; lunule large, cordate, distinct, bounded by an impressed line; anterior dorsal slope short, posterior dorsal slipe long and only very slightly convex; escutcheon broad and flat or slightly concave; ligamental channel equal in length to one third of posterior dorsal slope, base roundly arcuate; shell marke by concentric lamellae which become more prominent upon erosion of specimen, when they give it a corrugated appearance; radially marked by numerous fine ribs.

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Altitude 18 mm.; length 22mm.; thickness 10.5 mm.; lunule length 6 mm., width 4 mm.

The lower angle Pl. 1, fig. 5 and 8. two on the upper and

Shell pear shaped, with large body whorl; spire low, body whorl forms two thirds width of spire; an upper and lower angulation present, the former the more distinct; shell ornamented with twelve very prominent nodes to each whorl, these consist of two spiral rows of vertically elongated nodes, the upper row being so spaced as to alternate with the lower; both the lower and upper nodes are elongated and have from one to three cusps which are formed where the heavy spiral lines cross the raised area of the node; shell marked by twelve to fifteen spiral lines, between each of which are three finer lines of which the middle one is the wider; spiral lines crossed by numerous very fine longitudinal lines; mouth opening semi-circular to sub-triangular; outer lip thin; canal medium length, recurved.

This species is quite close to <u>F. kernianum</u>, cooper, of the Temblor formation, from which it differs as follows:--larger size, the maximum lengths being 120 and 60 mm., respectively; the spiral lines on <u>F. nodiferus</u> vary in width and show a tendency to be wavy, while those on <u>F. kernianum</u>

# Ficus nodiferus, Gabb.

## Pl. 1, fig. 5 and 8.

Shell pear shaped, with large body whorl; spire low, body whorl forms two thirds width of spire; an upper and lower angulation present, the former the more distinct; shell crnamented with twelve very prominent nodes to each whorl, these consist of two spiral rows of vertically elongated nodes, the upper row being so spaced as to alterers about the lower; both the lower and upper nodes are elongated and have from one to three cusps which are formed where the heavy spiral lines cross the raised area of the node; shell marked by twelve to fifteen spiral lines, between each of which are three finer lines of which the middle one is the wider; spiral lines crossed by numerous very fine longitudinal lines; mouth opening semi-circular to sub-triangular; outer lip thin; canal medium length, recurred.

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are very uniform; the former has generally only one point to each node on the upper angle, and two on each node of the lower angle, while the latter has two on the upper and two or three on the lower; in general the latter's nodes are vertically longer, and the cusps are more acutely pointed especially on the larger whorls.

Some specimens, especially the earlier whorls have the nodes small or nearly absent, and an oval cutline replaces the normal angulation of the body whorl. These resemble <u>F</u>. pyriformis, Gabb, very closely. As the shell grows larger the nodes and angulation increase in prominence until the mature shell shows only slight resemblance to <u>F</u>. pyriformis.

F. Stanfordensis and Ficus sp.? from the Lower Miccene of Contra Costa County, both represented only by casts, appear similar to F. nodiferus as far as could be told from casts.

This species is listed by Gabb as from both Ellsmere and Pico Canyons.

Altitude 36 mm.; width 25mm.; altitude of spire 10mm.; mouth opening length 32 mm., width 15mm.; largest specimen altitude 120 mm.

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# Gyrineum ellsmerensis, new sp.

Shell fusifo Pl. 2, fig. 1. ted, whorls five to six.

Shell bucciniform, spire high, apex broken, whorls two present; suture deeply impressed, whorls rounding out below suture; varices prominent; two or three low rounded nodes on angle of whorl between each two successive varices; shell cancellated, marked by fourteen flat spiral lines on outer lip, and twenty on the inner lip of body whorl; these are crossed by numerous fine longitudinal lines; mouth opening oval equal in height to half the total height of restored shell; outer lip greatly thickened, spiral lines showing on the inner surface of lip; inner lip thinly encrusted, and showing spiral lines; canal short.

This species appears to be close to Ranella mathewsoni, Gabb, It differs from Gabb's figure in smaller size, slightly more deeply impressed suture, and presence of nodes on angle.

Altitude 28 mm.; width 20 mm.; thickness 14 mm.; mouth opening height 15 mm., width 8 mm.

# Gyrineum ellemerensis, new sp.

Pl. 2, fig. 1.

Shell bucciniform, spire high, apex broken, whorls two present; suture deeply impressed, whorls rounding out below suture; varices prominent; two or three low rounded nodes on angle of whorl between each two successive varices; shell cencellated, marked by fourteen flat spiral lines on outer lip, and twenty on the inner lip of body whorl; these are crossed by numerous fine longitudinal lines; mouth opening oval equal in height to half the total height of restored shell; outer lip greatly thickened, spiral lines showing on the inner surface of lip; inner lip thinly encrusted, and showing spiral lines; canal short.

This species appears to be close to Ranella mathewsoni, Gabb, It differs from Gabb's figure in smaller size, slight more deeply impressed suture, and presence of nodes on angle

Altitude 28 mm.; width 20 mm.; thickness 14 mm.; mouth opening height 15 mm., width 8 mm.

## Cancellaria ellsmerensis, new sp.

Cancel Pl. 2, fig. 2.5, dabb, war,

Shell fusiform, spire elevated, whorls five to six, slightly angulated below the suture; suture impressed, angulation absent on the body whorl; mouth opening narrow equal to half the height of shell; whorls ornamented with ten to twelve longitudinal ridges, on body whorl these become irregular in shape, and the angulation is absent; whorls show three or four extremely faint radial lines, which are absent in body whorl except for small area on posterior part of columella; outer lip thin, columella encrusted, smooth except for two acute plications anteriorly; canal short straight.

This species is similar to <u>C. cooperi</u>, Gabb, from which it differs by smaller size, absence of angulation on body whorl, and the irregular growth lines on body whorl.

Altitude 25 mm.; width 12mm.; mouth opening length equal to about half total height of shell, width 5 mm.

Cancellaria ellamerensis, new sp. Pl. 2, fig. 2.

Shell fusiform, spire elevated, whorls five to six, slightly angulated below the suture; suture impressed, angulation absent on the body whorl; mouth opening narrow equal to half the height of shell; whorls ornamented with ten to twelve longitudinal ridges, on body whorl these become irregular in shape, and the angulation is absent; whorls show three or four extremely faint radial lines, which are absent in body whorl except for small area on posterior part of columnla; outer lip thin, columnla encrusted, smooth except for two acute plications anteriorly; canal short straight.

This species is similar to C. cooperi, Gabb, from which it differs by smaller size, absence of angulation on body whork, and the irregular growth lines on body whork

Altitude 25 mm.; width 12mm.; mouth opening length equal to about half total height of shell, width 5 mm.

Turris ellamereneis, new sp.

Pl. 2 Pig. 3 and 4.

Shell small, fusiform, spire high, apex unknown, who 19

angulata new var.

Pl. 1, fig. 3. who re evenly convex.

Size medium, spire elevated, apex absent, three
whorls presentl whorls angulated below suture; ornamented
by twleve transverse ribs on each whorl, the ribs forming
nodes along the shoulder; lower part of the body whorl
concave outwardly in outline, and the vertical ridges

are absent from this part; shell spirally ornamented

by alternating coarse and fine lines; outer lip smooth,

inner lip encrusted; canal short and straight.

prominence of the vertical ridges, and greater angulation.

In the angulation this variety resembles the earlier

whorls of C. tritonidae. Turris coalingensis, from which

Altitude 20 mm.; width 17 mm.; height of mouth, and opening equal to half total height of shell.

urnold from Bath-House Beach, Santa Barbara, by finer spiral urnold, Ralph. U.S.Mat. Mus. Paper 1781, pl. 57, fig. 4.

ibbing and shorter canal.

Altitude 29mm.; width limm.; mouth opening height 17 mm., adth 5mm.; pesterior canal width 2 mm., depth 3 mm.

Cancellaria tritonidae, Gabb, var.
angulata new var.
Pl. 1, fig. 3.

Size medium, spire elevated, apex absent, three whorls presentl whorls angulated below suture; ornamented by twleve transverse ribs on each wherl, the ribs forming nodes along the shoulder; lower part of the body wherl concave outwardly in outline, and the vertical ridges are absent from this part; shell spirally ornamented by alternating coarse and fine lines; outer lip smooth, inner lip encrusted; canal short and straight.

This variety differs from C. tritonidae in smaller prominence of the vertical ridges, and greater angulation. In the angulation this variety resembles the earlier whorls of C. tritonidae.

Altitude 20 mm.; width 17 mm.; height of mouth opening equal to half total height of shell.

# Turris ellsmerensis, new sp.

Pl. 2 Fig. 3 and 4.

Shell small, fusiform, spire high, apex unknown, whorls four to five present; angulated near suture, shoulder concave, whorls slightly convex below angle, body whork evenly convex; longitudinal sculpture eleven to twelve prominent rounded ridges which slope slightly to the left, and are most prominent on upper part of whorl near angle, but are not present on the shoulder; shell spirally marked by two to three lines above and seven to eight lines below angle; body whorl and columella ornamented by twenty five spiral lines which are sometimes subequal and alternating; aperture narrow, outer lip thin and smooth, prominently reflected; posterior sinus deep along suture, anterior edge of the sinus parallel to the line of angulation; canal short curved slightly backwards from the aperture; columella smooth.

This species is close to <u>Turris coalingensis</u>, from which it differs by having spiral lines infer and more numerous, and no difference in coarseness of sculpture on body whorl and on columella. It differs from <u>Mangilia tabulatus</u> as figured by Arnold from Bath-House Beach, Santa Barbara, by finer spiral Arnold, Ralph. U.S.Nat. Mus. Paper 1781, pl. 57, fig. 4. ribbing and shorter canal.

Altitude 29mm.; width 11mm.; mouth opening height 17 mm.; width 5mm.; posterior canal width 2 mm., depth 3 mm.

# Turris ellamerensis, new sp.

Pl. 2 Fig. 3 and 4.

Shell smell, flusiform, spire high, apex unknown, whorls four to five present; angulated near suture, shoulder concave, whorls slightly convex below angle, body whork evenly convex; longitudinal sculpture eleven to twelve prominent rounded ridges which slope slightly to the left, and are most prominent on upper part of whorl near angle, but are not present on the shoulder; shell spirally marked by two to three lines above and serven to eight lines below angle; body whorl and columella ornamented by twenty five spiral lines which are sometimes subequal and alternating; aperture narrow, outer lip thin and smooth, prominently reflected; posterior sinus deep along suture, anterior edge of the sinus parallel to the line of angulation; canal short curved slightly backwards from the aperture; columella smooth.

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Altitude 29mm.; width 11mm.; mouth opening height 17 mm.; width 5mm.; posterior canal width 2 mm., depth 5 mm.

# Turris fernandoensis, new sp.

Marplanation of Plate 1.

Man 1. Chione allem

Pl. 2, fig. 6.

Shell small fusiform, spire high, equal in height to the mouth opening; whorls five, roundly angulated, suture following line of angulation of preceding whorl; posterior canal on upper slope of body whorl, prominent, wide, triangular with angle of 135° between sides; lower part of body whorl and canal ornamented by faint spiral lines which may have been worn off of rest of whorl; mouth opening narrow; cuter lip broken; columella simple; canal medium length, straight.

This species is similar in shape and size to Astyris richthofeni, but is longer anteriorly, and is distinguishable by the presence of anterior sinus.

Altitude 21 mm.; width 9 mm.; mouth opening height 11.5 mm., width 3.5 mm.

Yis. 7. Schingrachinus exceptricus, Esch. var. minocon. var. Fig. C. Figur modifierus, Gabb, largar specimen anowing the

Pig. 9. Astrodappis fernandoangla, Pack.

Shell small fusiform, spire high, equal in height to the mouth opening; whorls five, roundly angulated, suture following line of angulation of preceding whorl; posterior canal on upper slope of body whorl, prominent, wide, triangular with angle of 1550 between sides; lower part of body whorl and canal ornamented by faint spiral lines which may have been worn off of rest of whorl; mouth opening narrow; outer lip broken; columella simple; canal medium length, straight.

This species is similar in shape and size to Astyris
richthofeni, but is longer anteriorly, and is distinguish
able by the presence of anterior sinus.

Altitude 21 mm.; width 9 mm.; mouth opening height

#### Explanation of Plate 1.

#### All figures natural size.

- Fig. 1. Chione ellsmerensis, n. sp.
- Fig. 2. Same as fig. 1., showing hinge.
- Fig. 3. Cancellaria tritonidae, Gabb, var. angulata, new var.
- Fig. 4. Chione fernandoensis, n. sp. anterior view.
- Fig. 5. Same as fig. 4, view of left valve.

#### Explanation of Plate 2.

#### All figures natural size.

- Fig. 1. Gyrineum ellsmerensis, n. sp.
- Fig. 2. Cancellaria ellsmerensis, n. sp.
- Fig. 3. Turris ellsmerensis, n. sp.
- Fig. 4. Turris ellsmerensis, n. sp. side view.
- Fig. 5. Ficus nodiferus, Gabb.
- Fig. 6. Turris fernandoensis, n. sp.
- Fig. 7. Echinarachinus excentricus, Esch. var. minor, n.var.
- Fig. 8. Ficus nodiferus, Gabb. larger specimen showing the more prominent nodes and angulation.
- Fig. 9. Astrodapsis fernandoensis, Pack.

# Explanation of Plate 1.

# .esia Inturan aerugit IIA

- Fig. 1. Chione ellemerensis, n. sp.
- Fig. 2. Same as fig. 1., showing hinge.
- Fig. 3. Cancellaria tritonidae, Gabb, var. angulata, new v
  - Fig. 4. Chione fernandoensis, n. sp. anterior view.
    - Fig. 5. Same as fig. 4, view of left valve.

# Explanation of Plate 2.

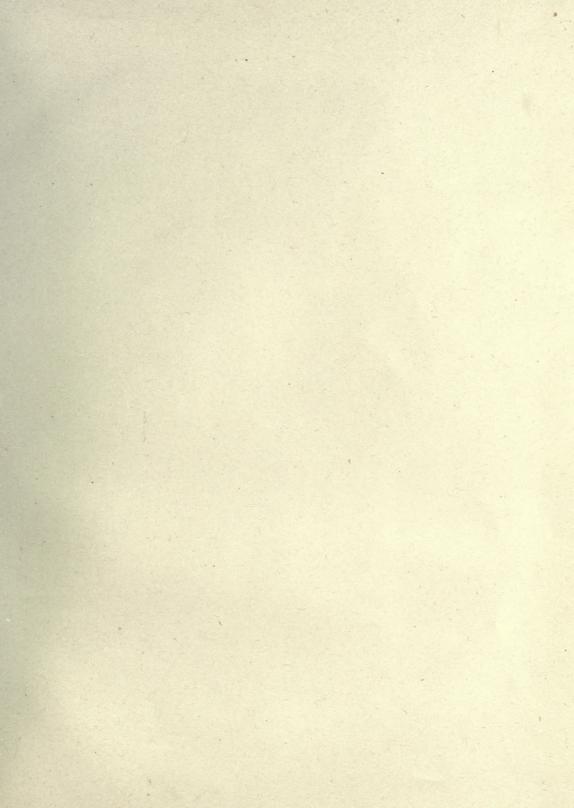
# All figures natural size.

- Fig. 1. Gyrineum ellemereneis, n. sp.
- Fig. 2. Cancellaria ellamerensis, n. sp.
  - Fig. 5. Turrie ellamerensis, n. sp.
- Wig. A. Turnis elizamerensis, n. ep. side view.
  - Fig. 5. Ficus nodiferus, Gabb.
  - Fig. 6. Turris fernandoensis, n. sp.
- Fig. 7. Mchinarachinus excentricus, Esch. var. minor, h. var
- Fig. 8. Ficus nodiferus, Cabb. larger specimen showing the more prominent nodes and angulation.

Fig. 9: Astrodapsis fernandoensis, Pack.



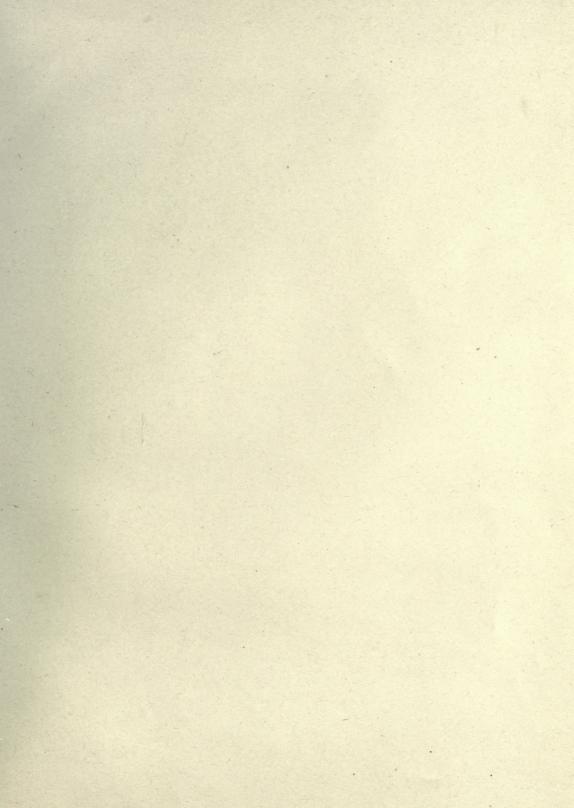








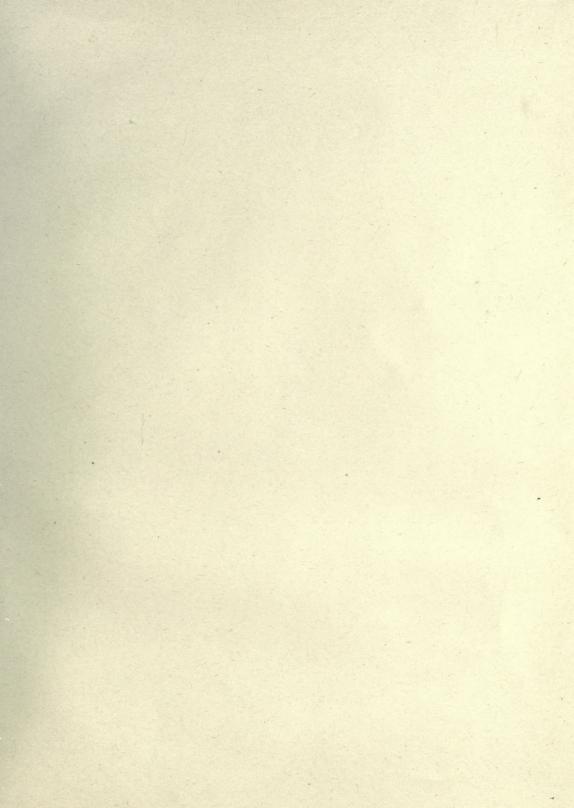




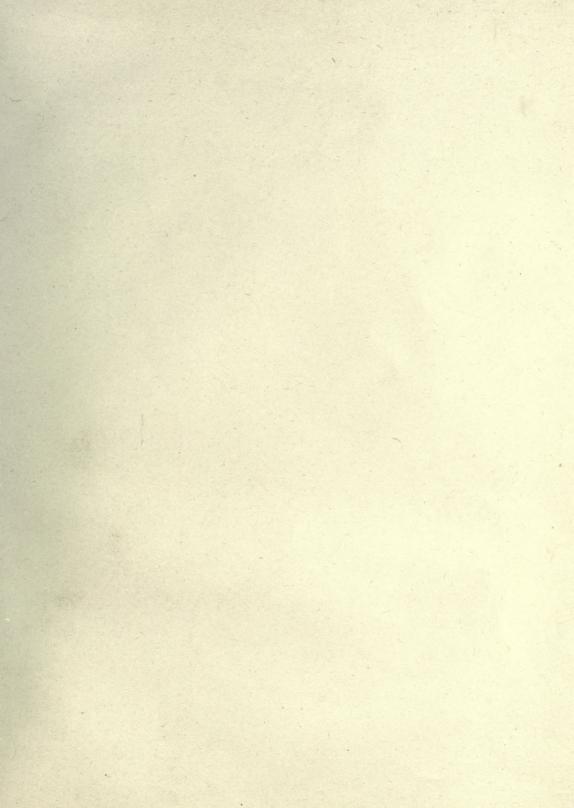












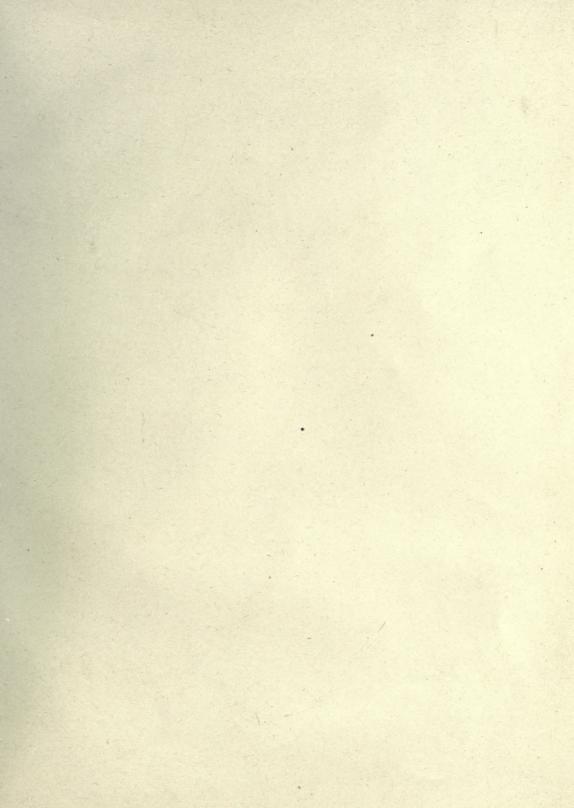




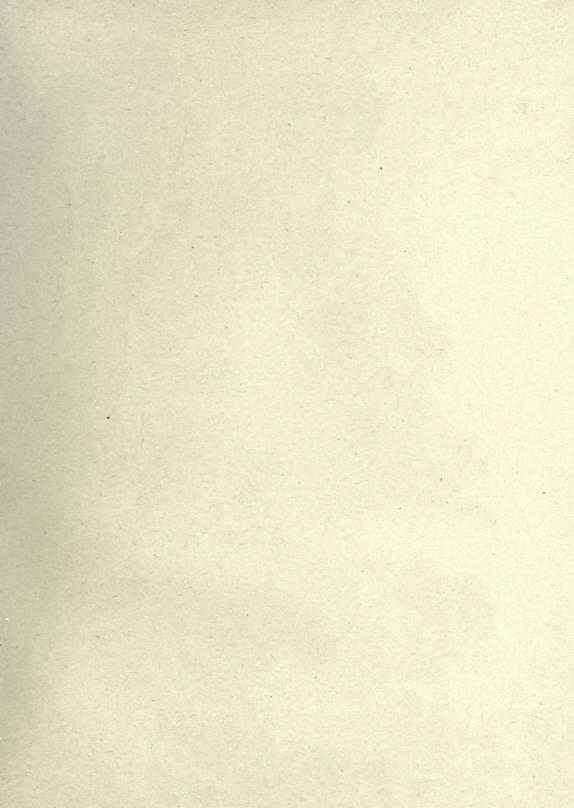












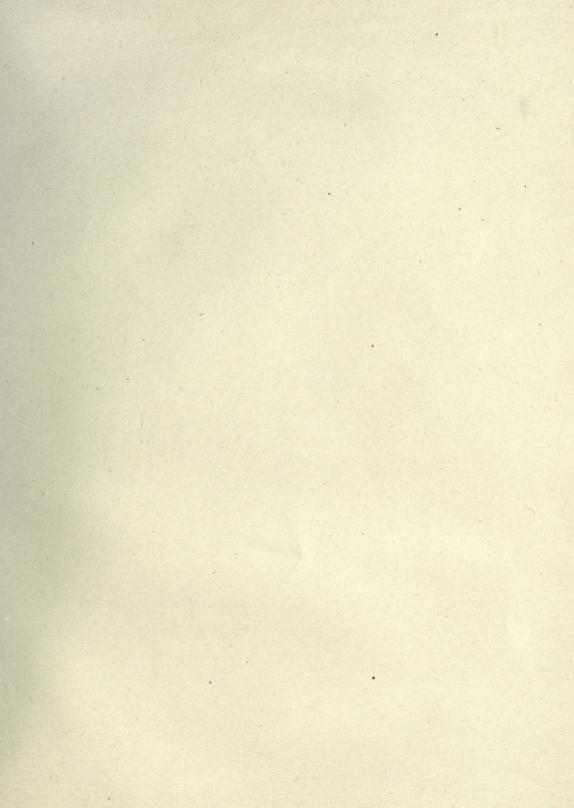


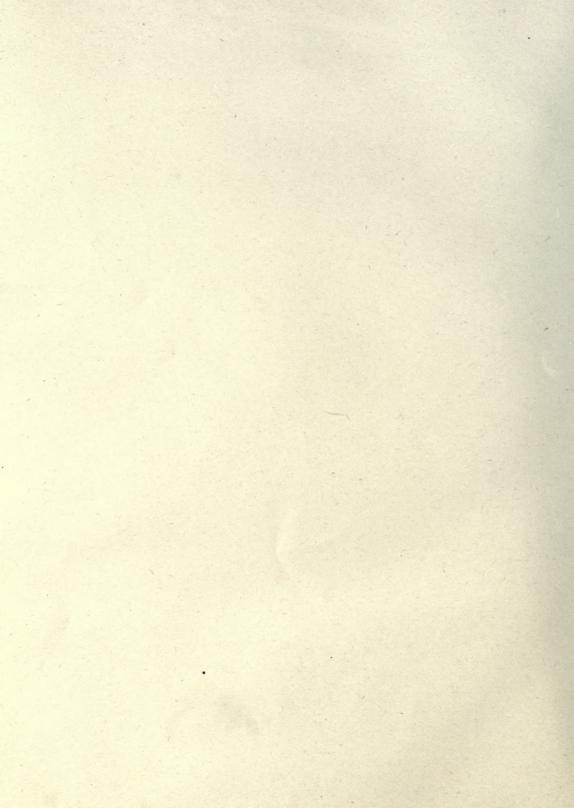






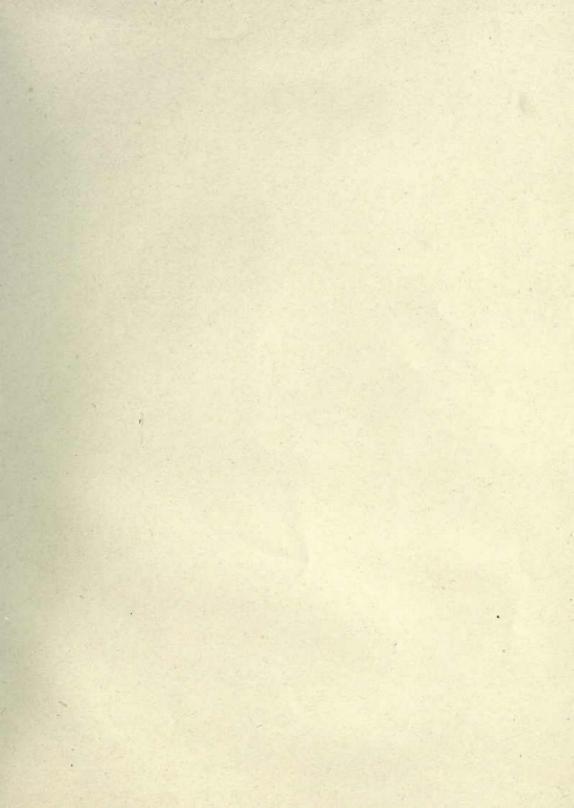


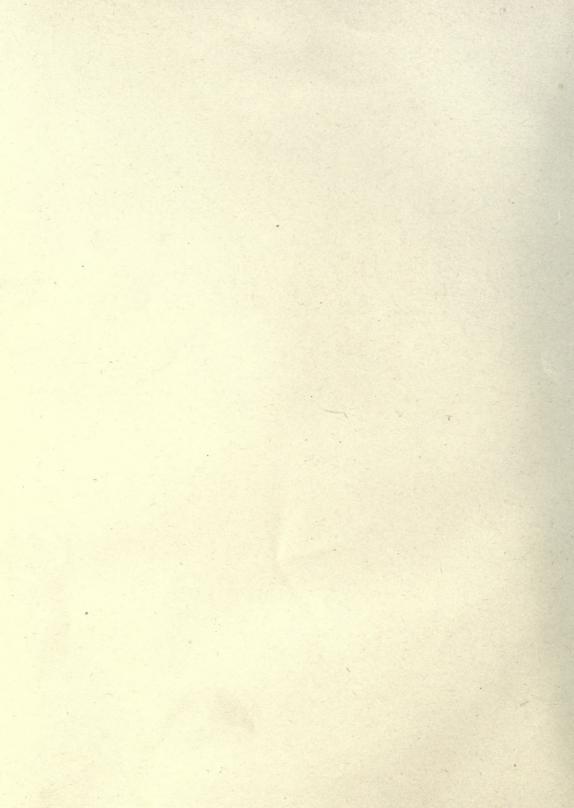


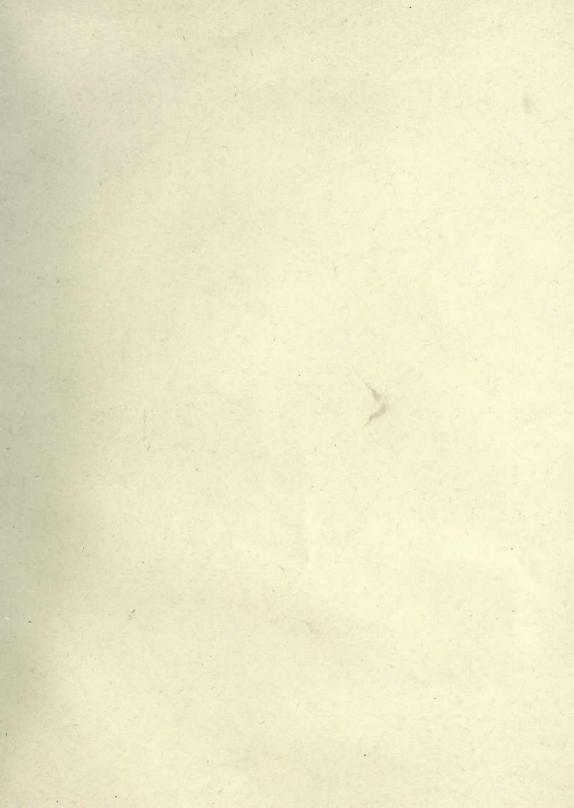




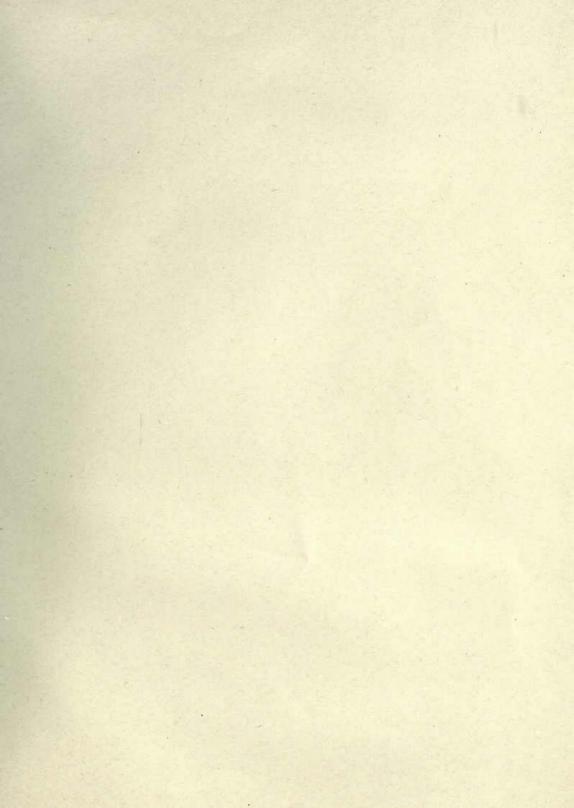


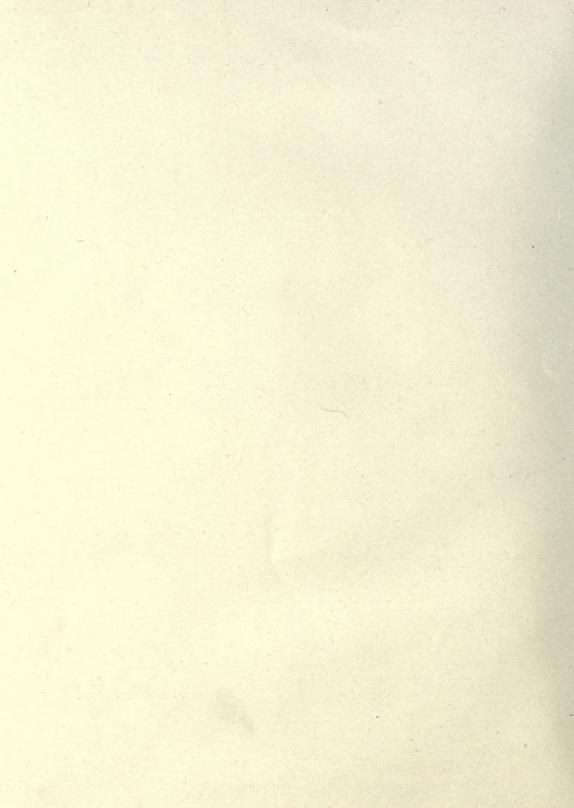


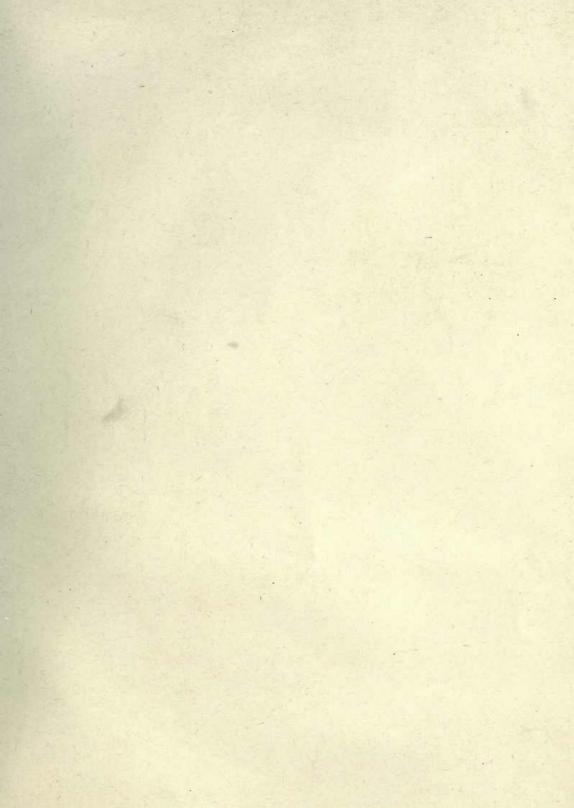


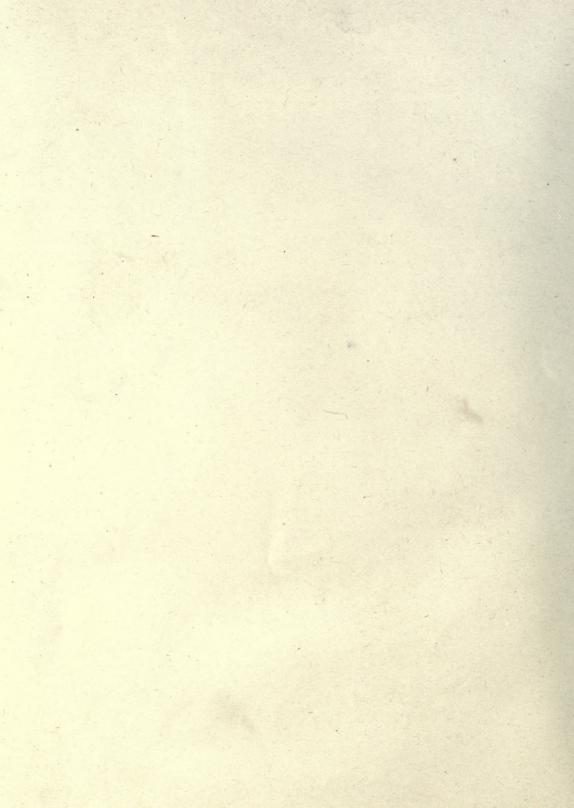




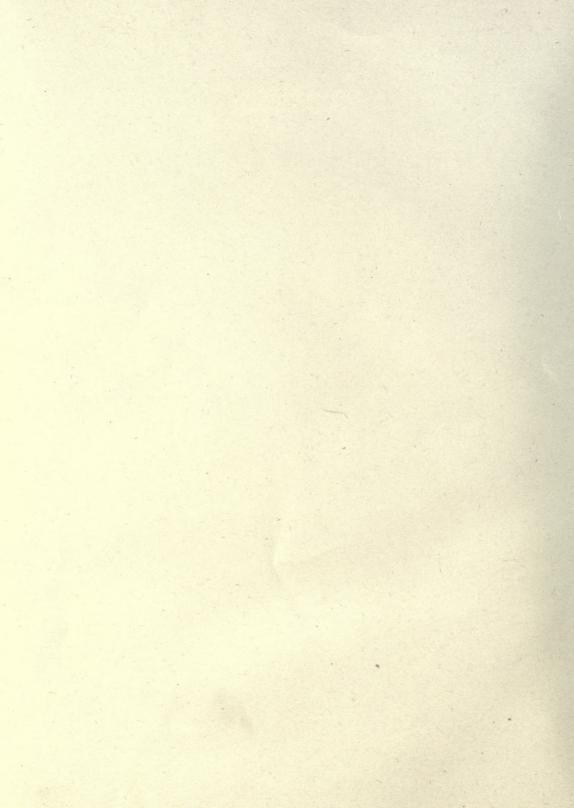


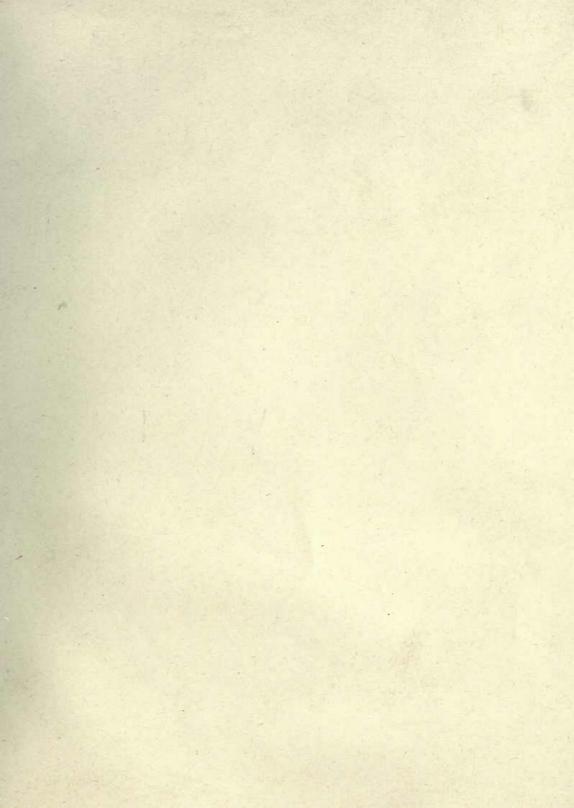




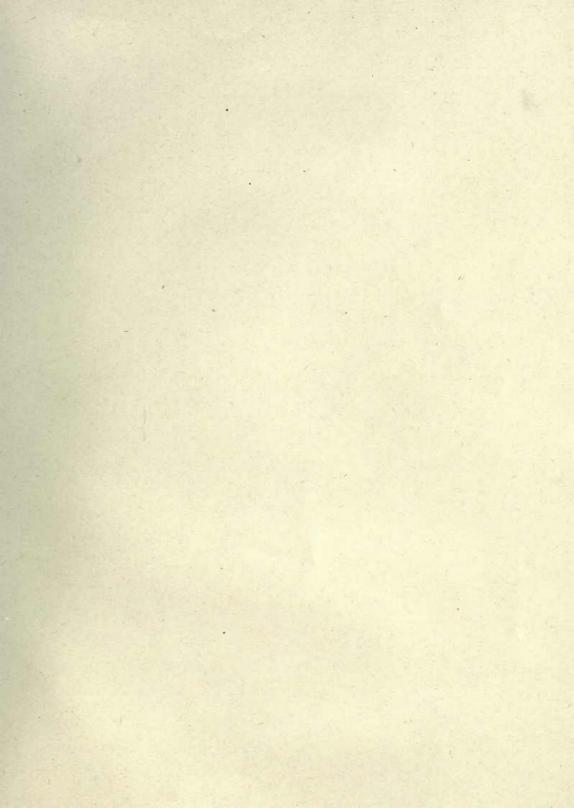


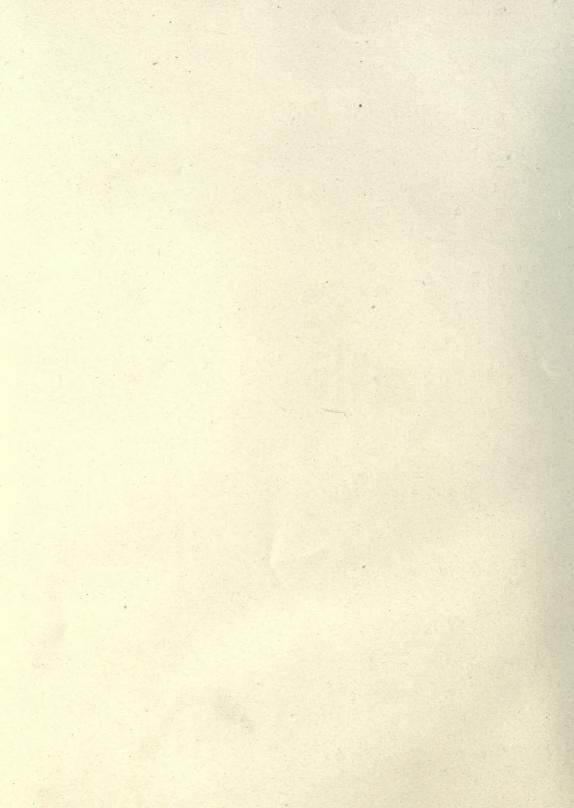


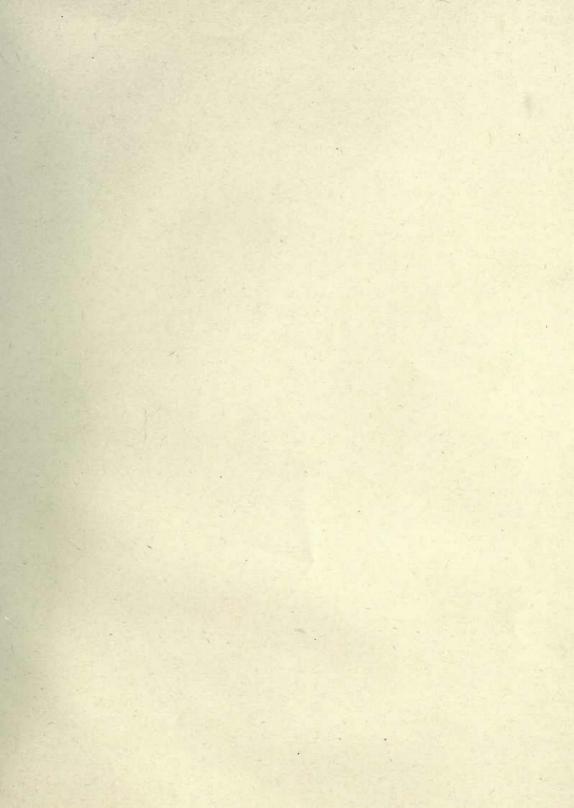




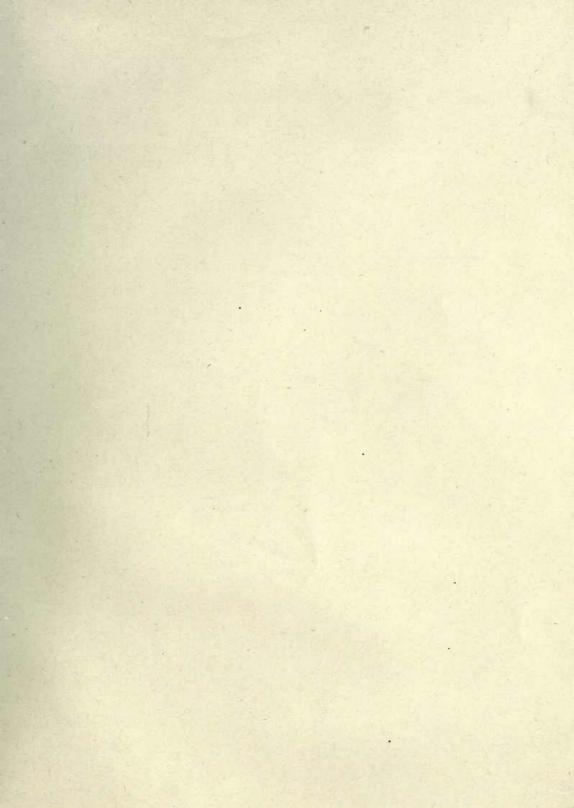


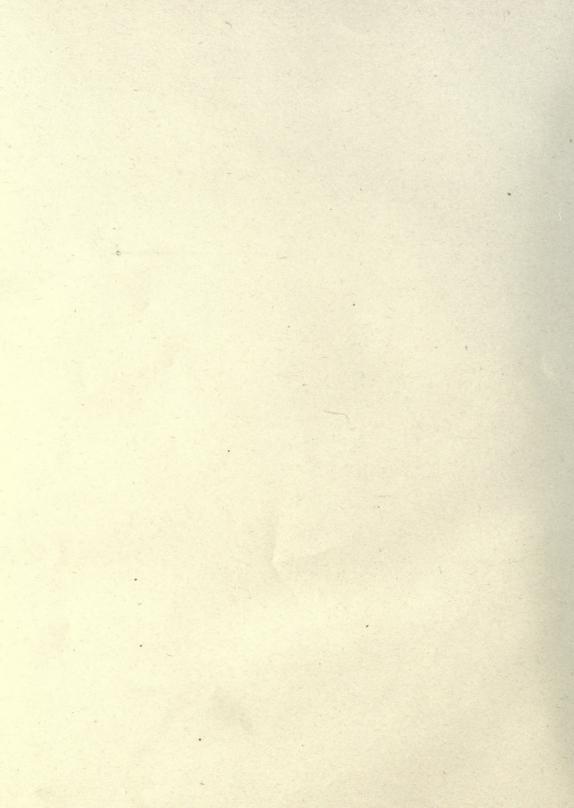


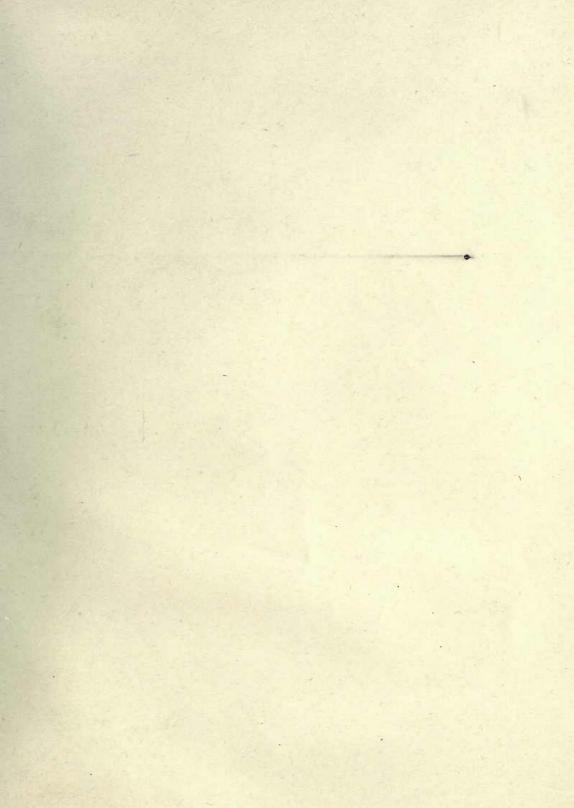


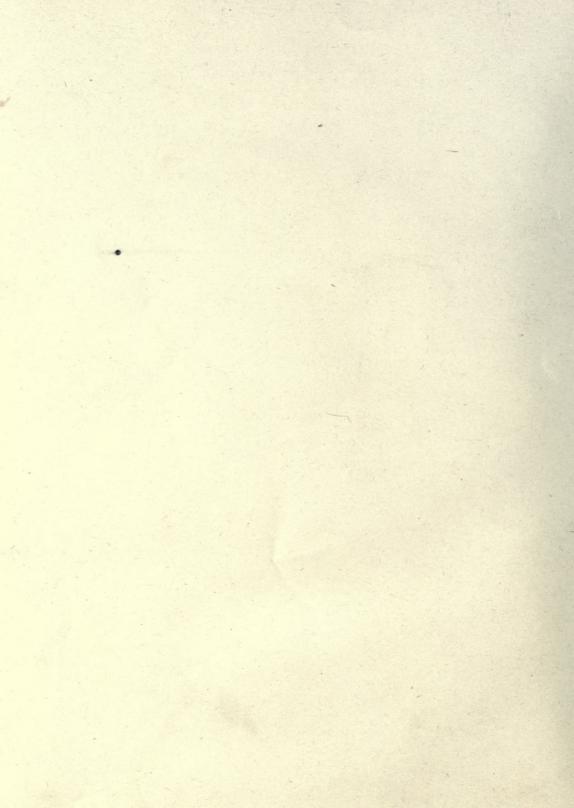


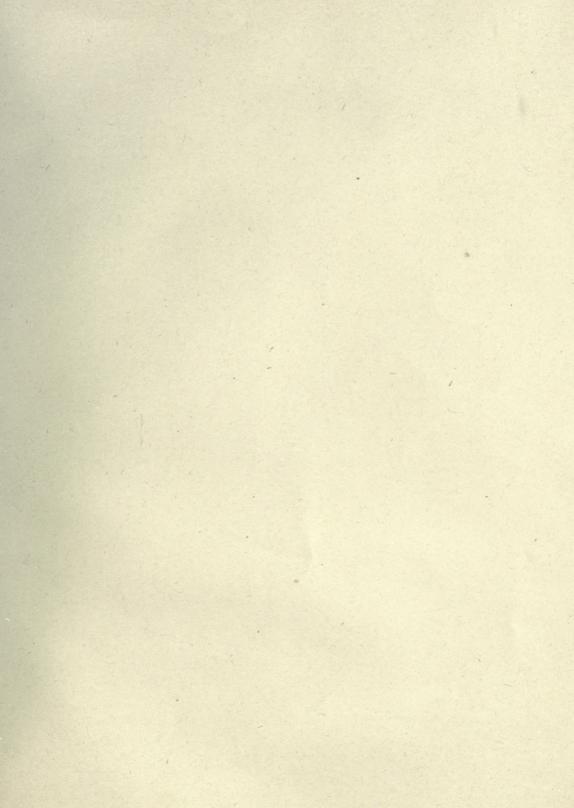


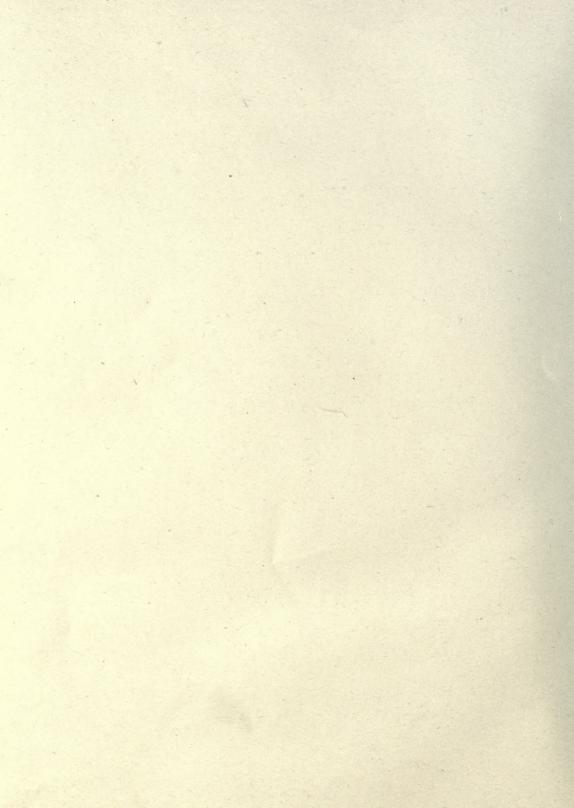


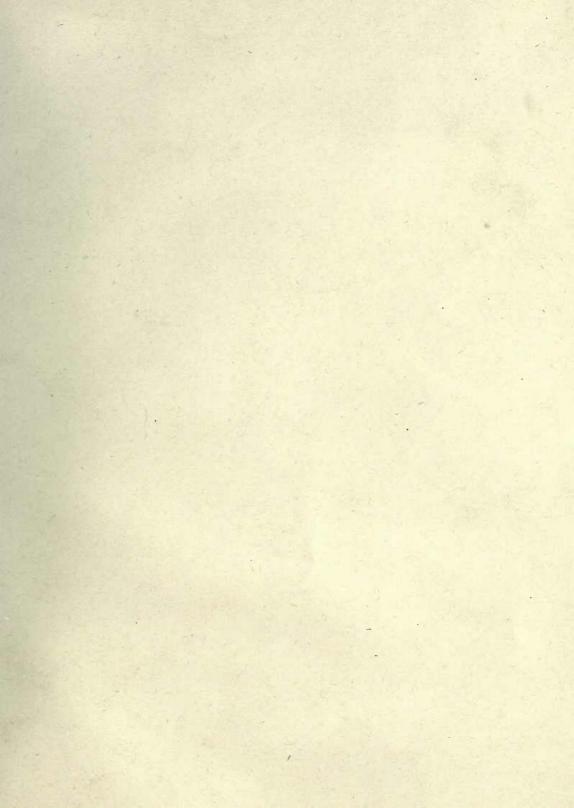


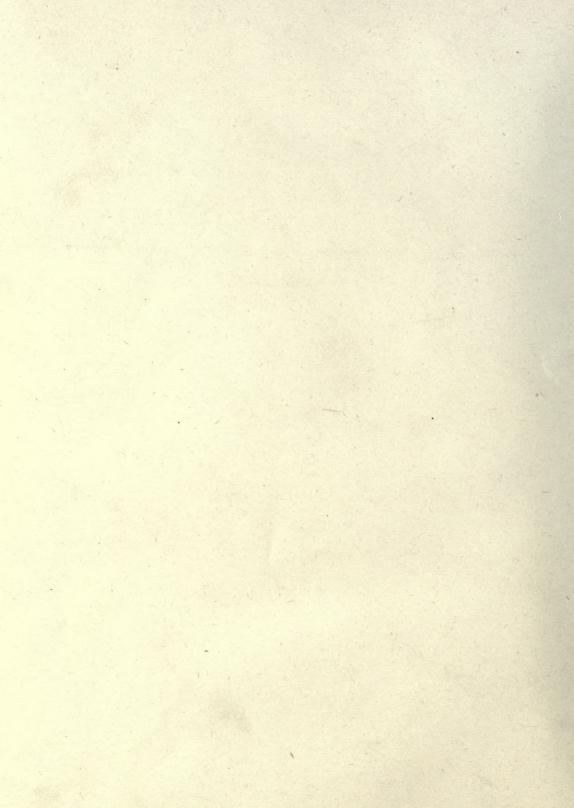


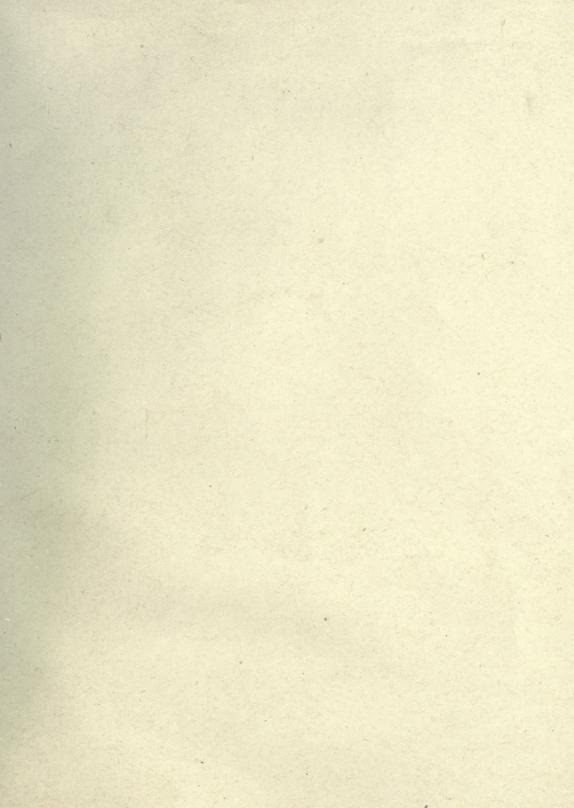


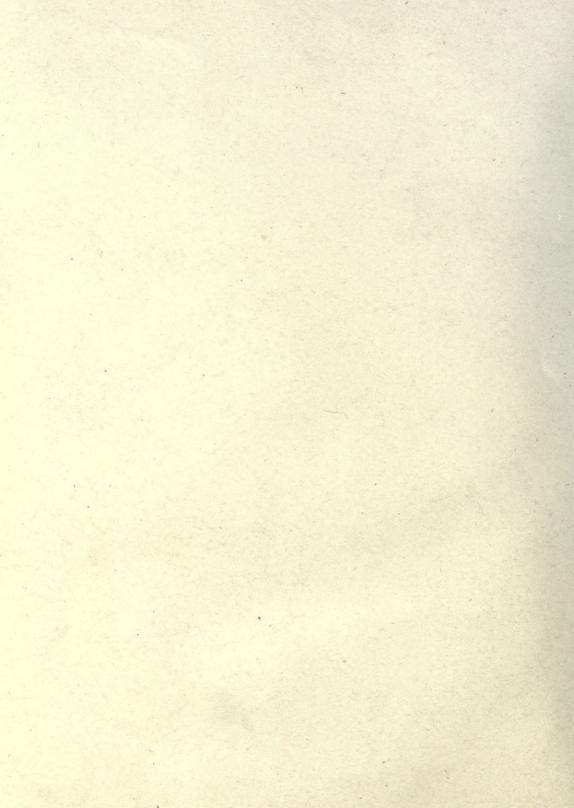


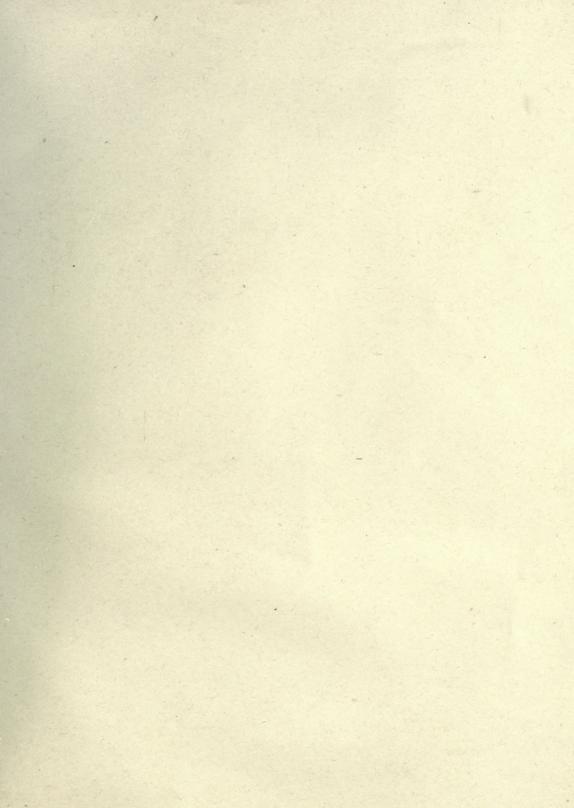


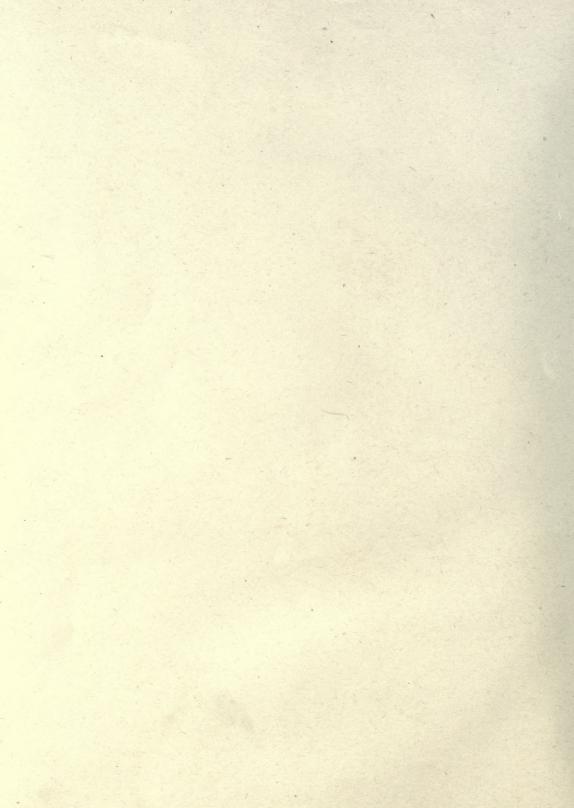


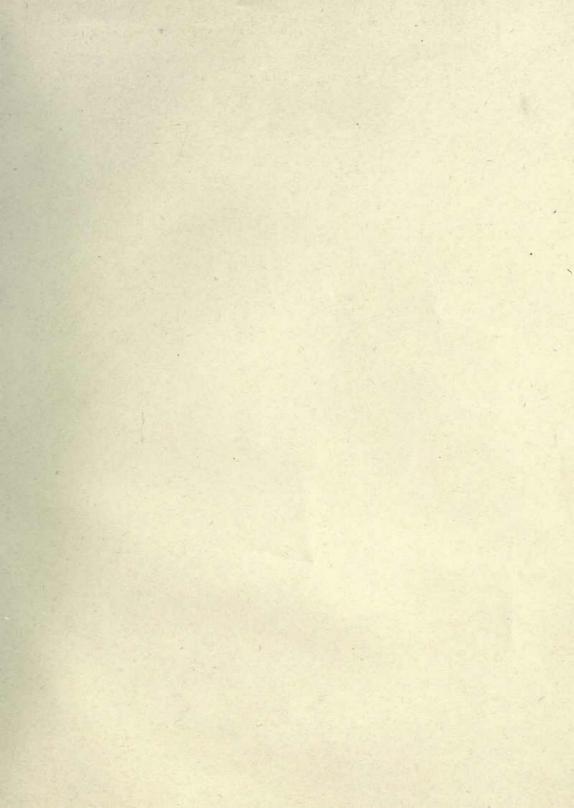


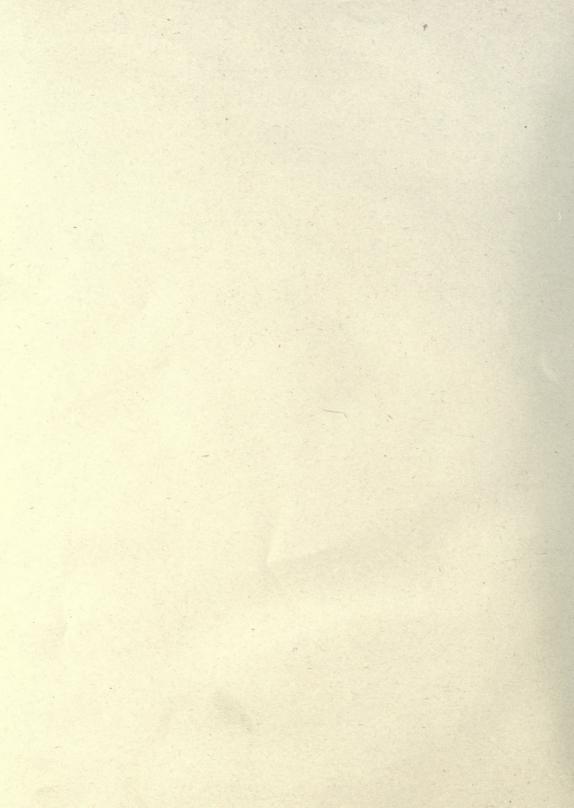


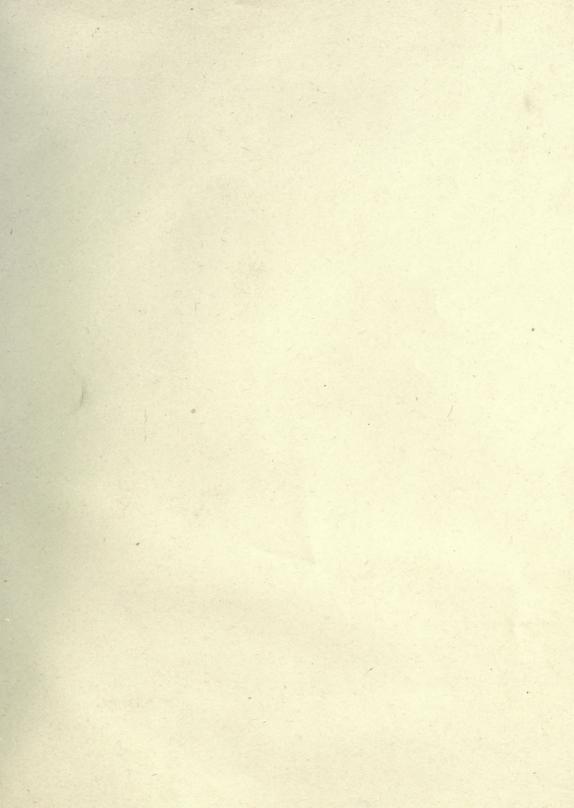


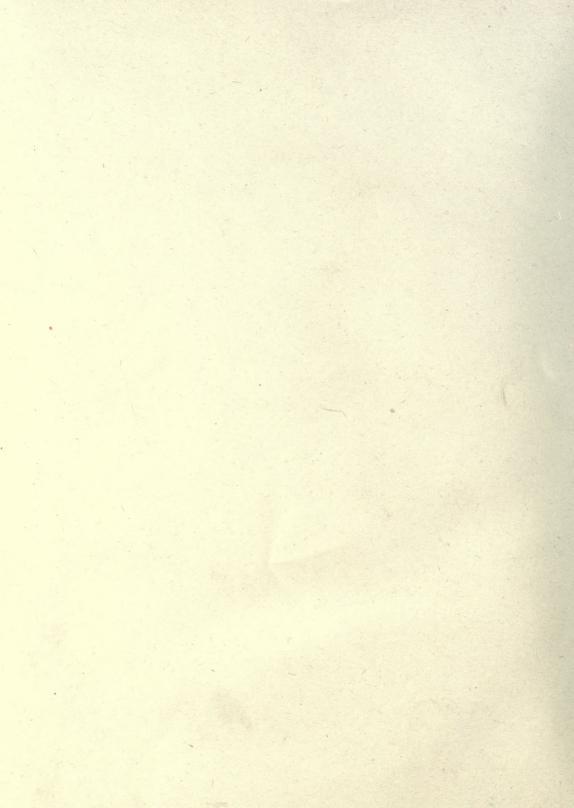


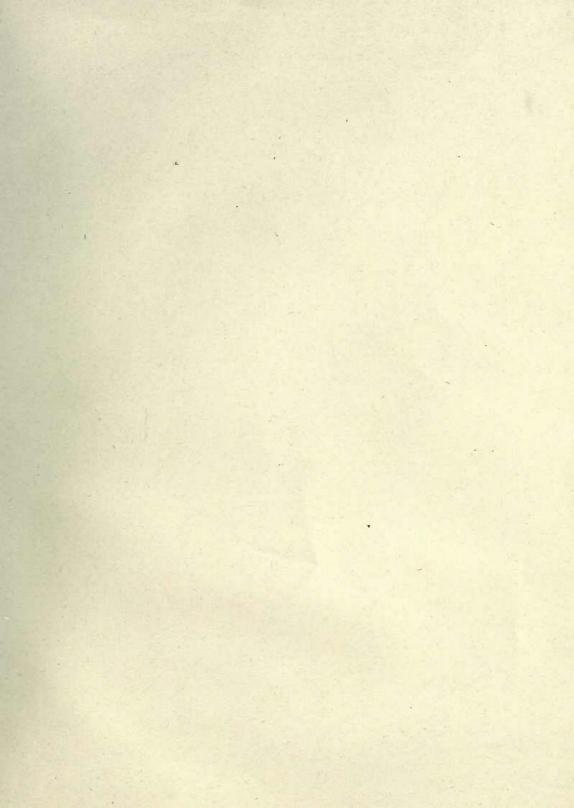










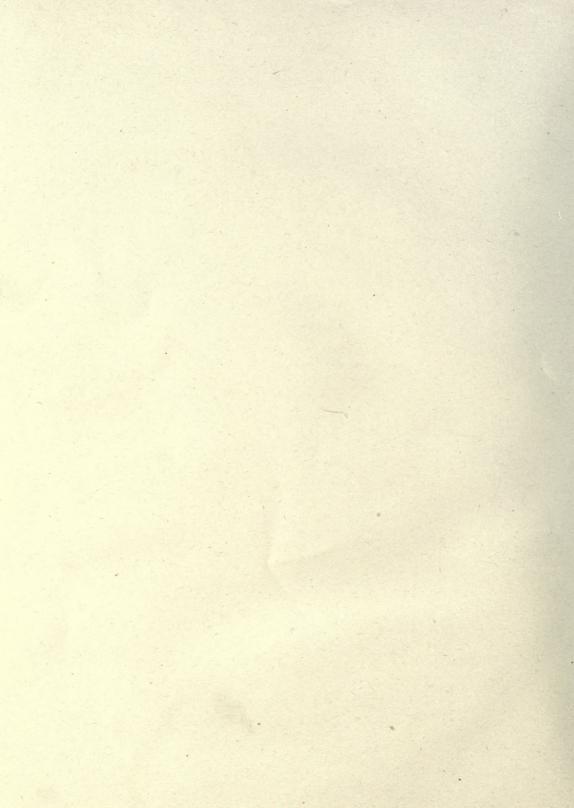


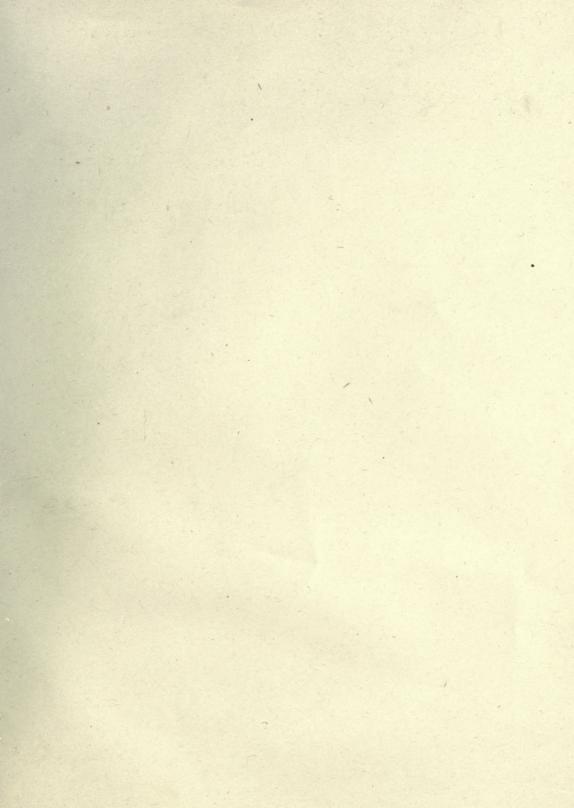


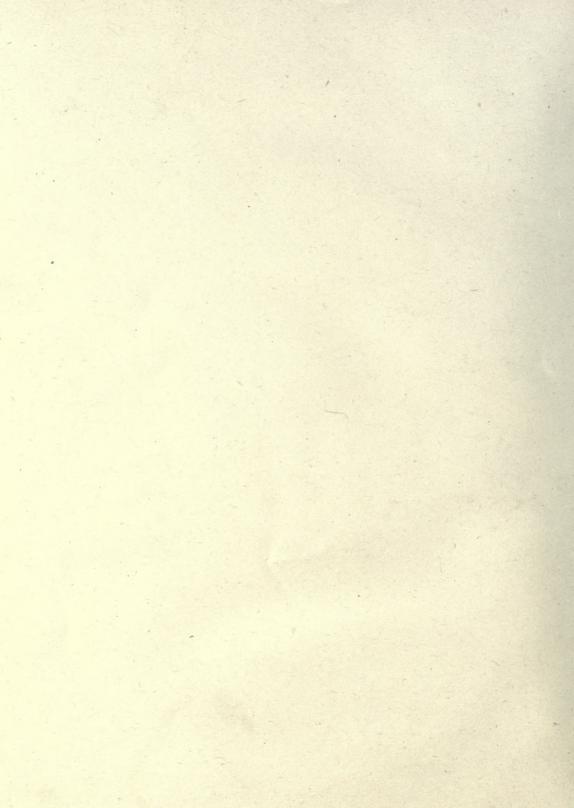


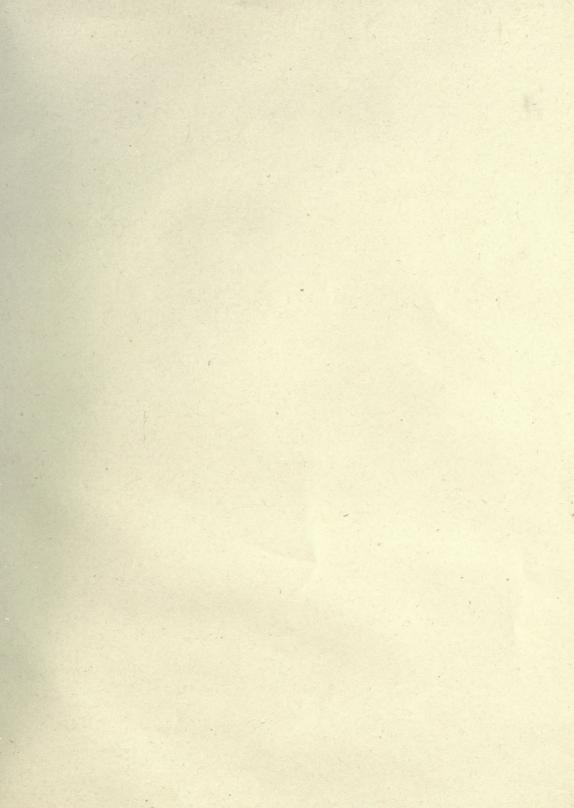


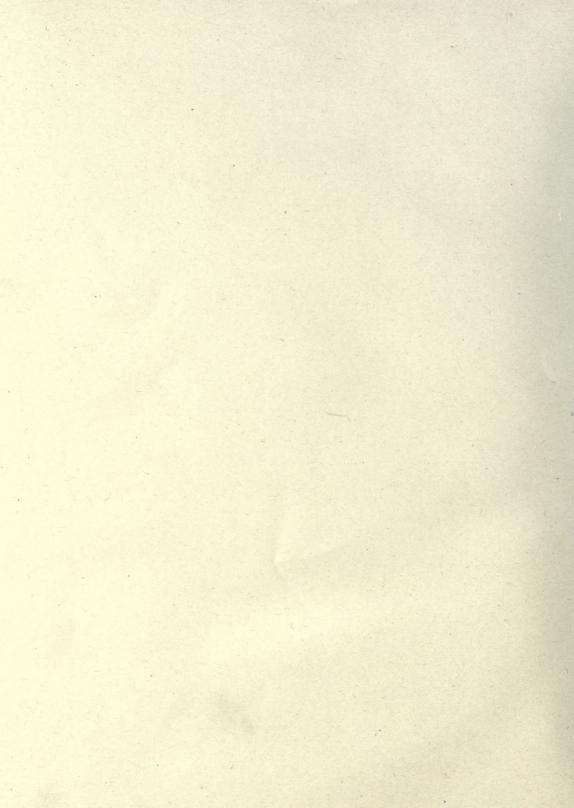


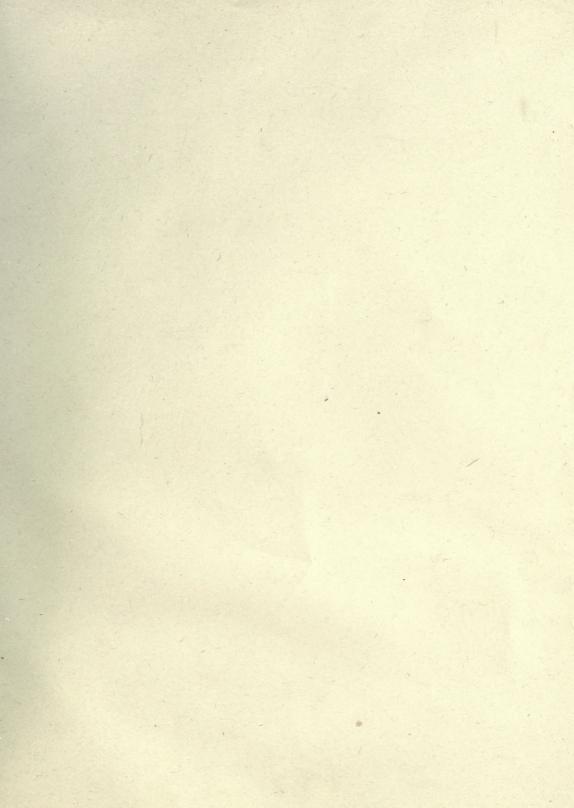


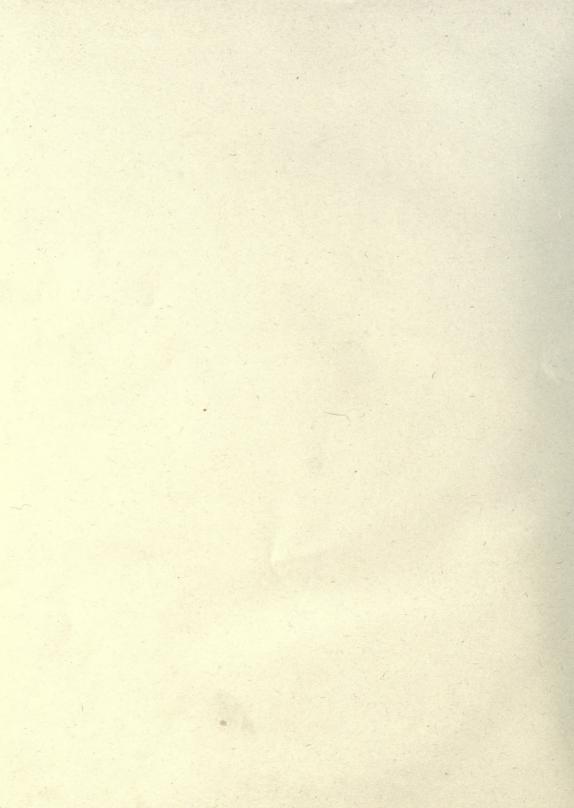


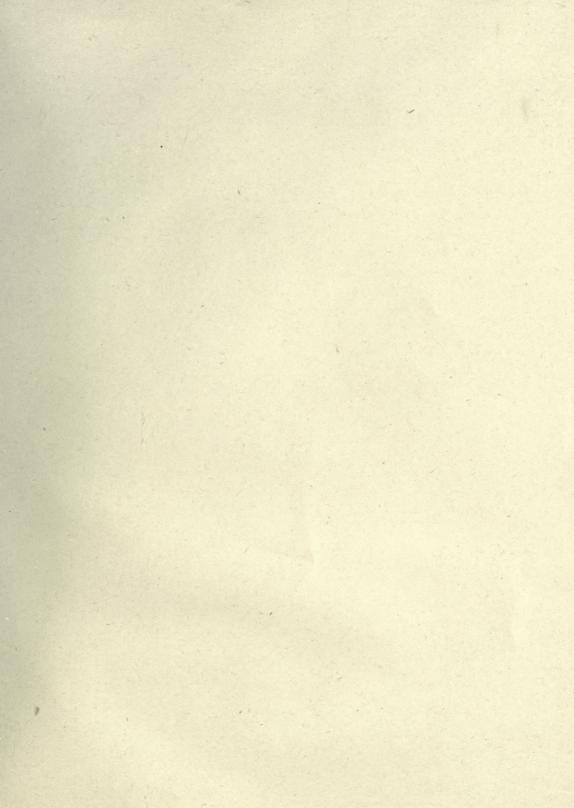


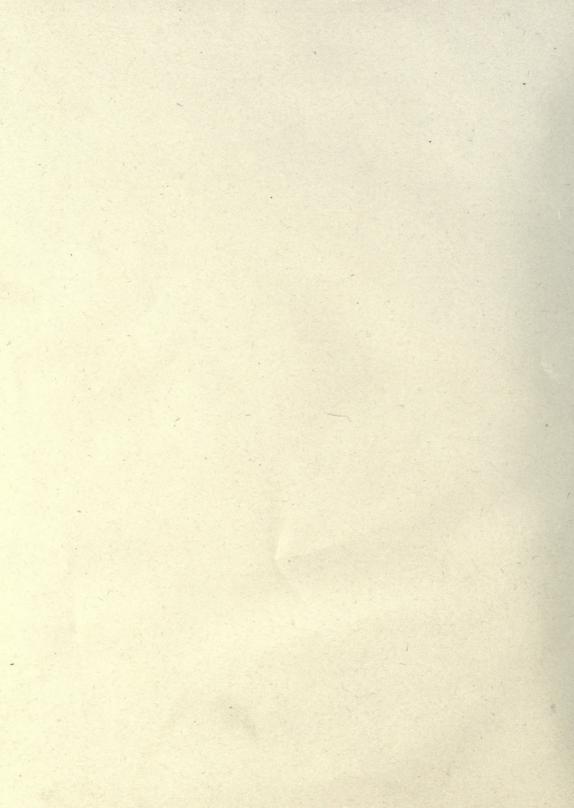


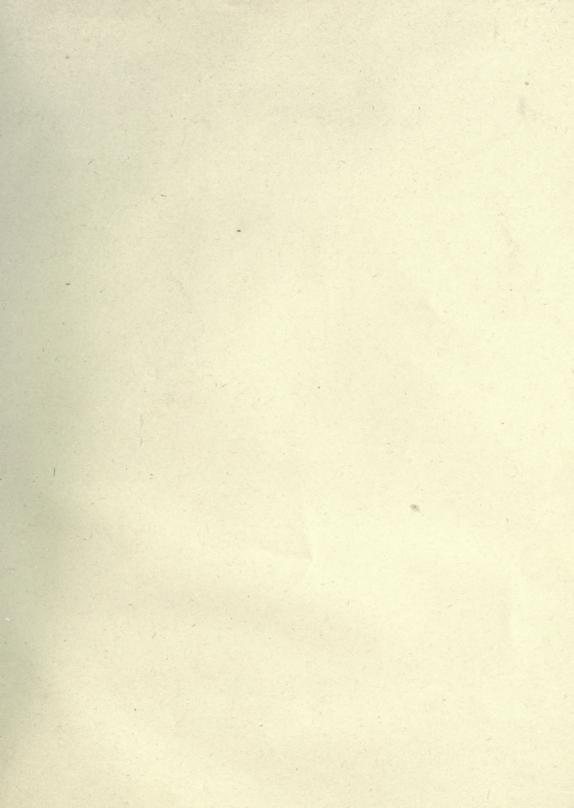


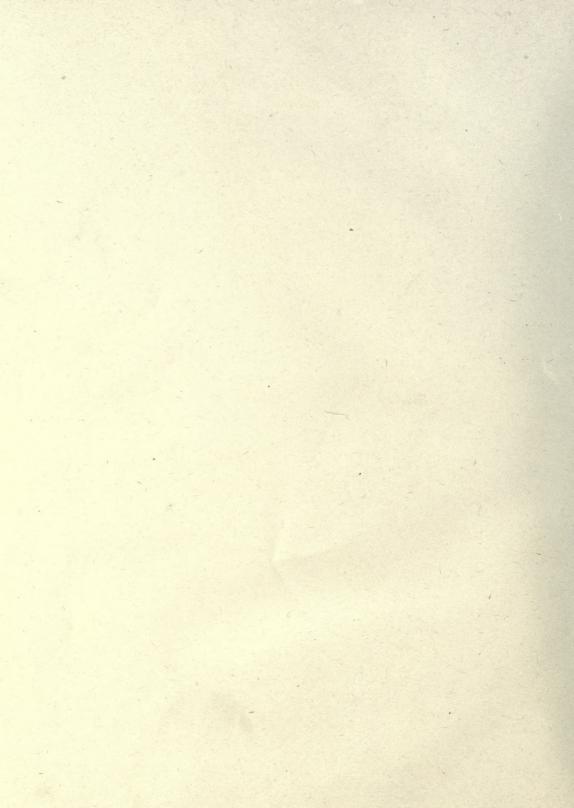


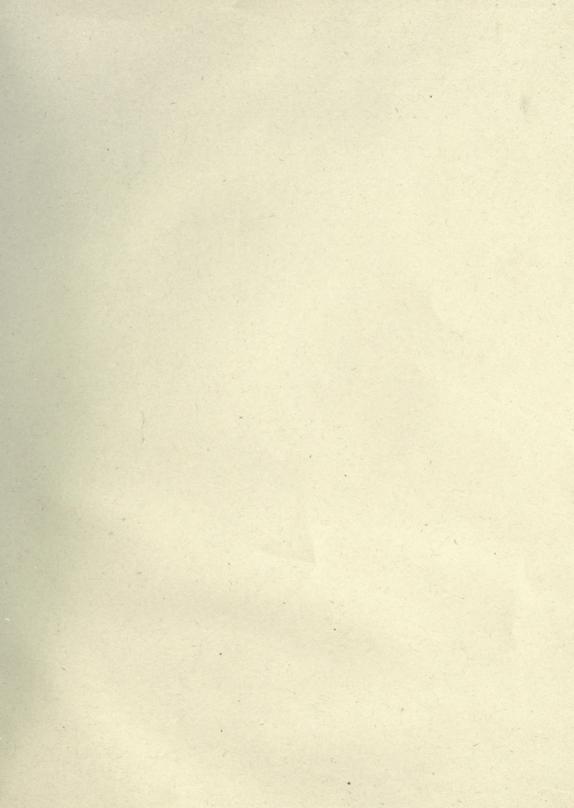


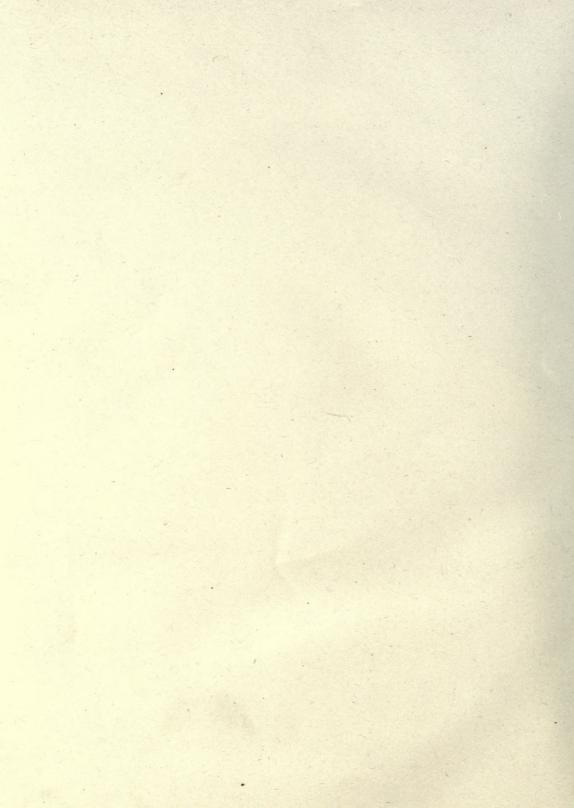


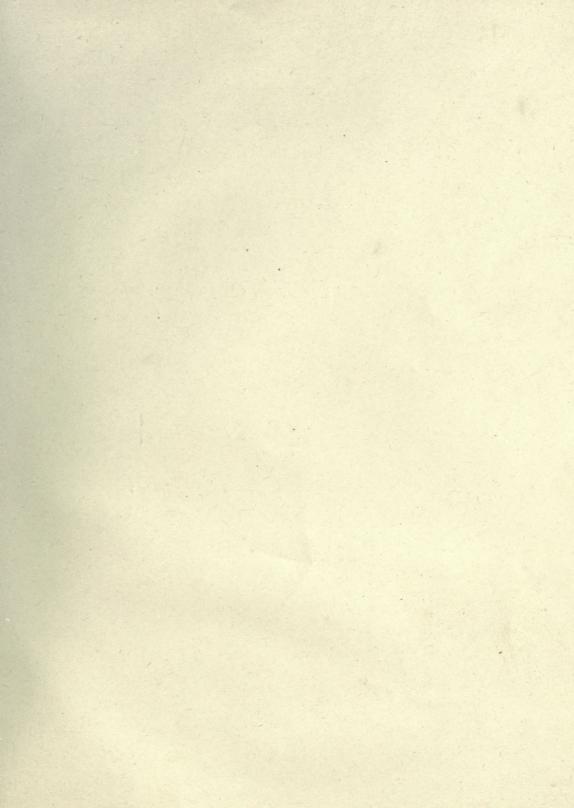




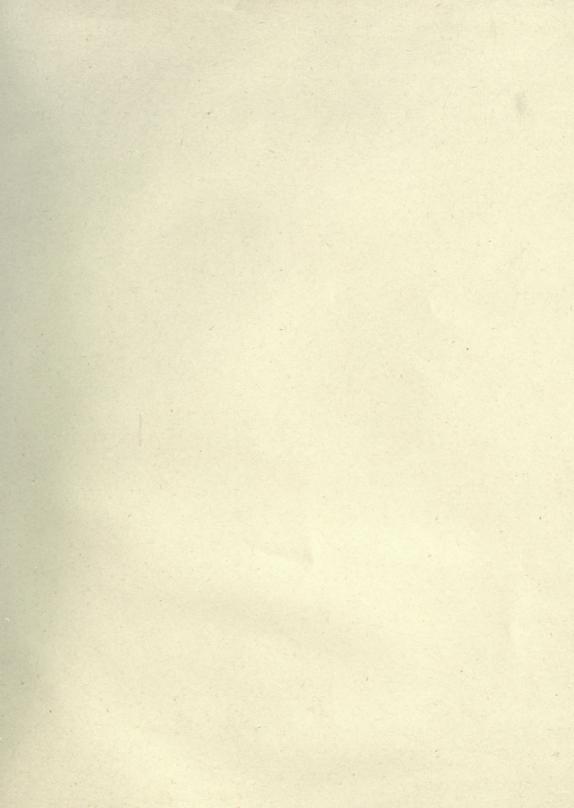


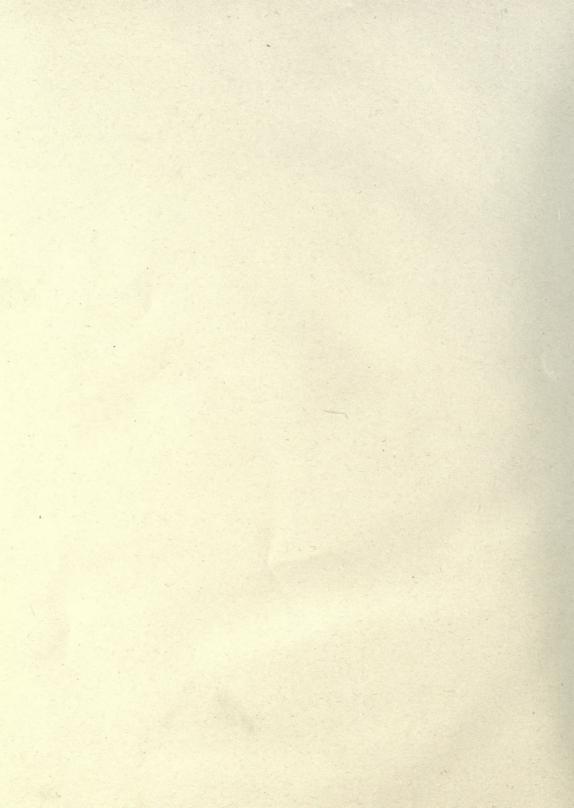


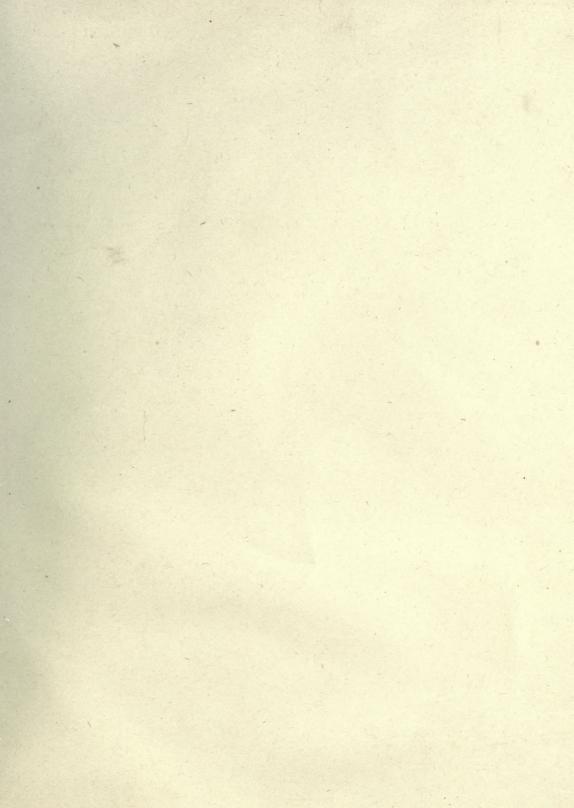


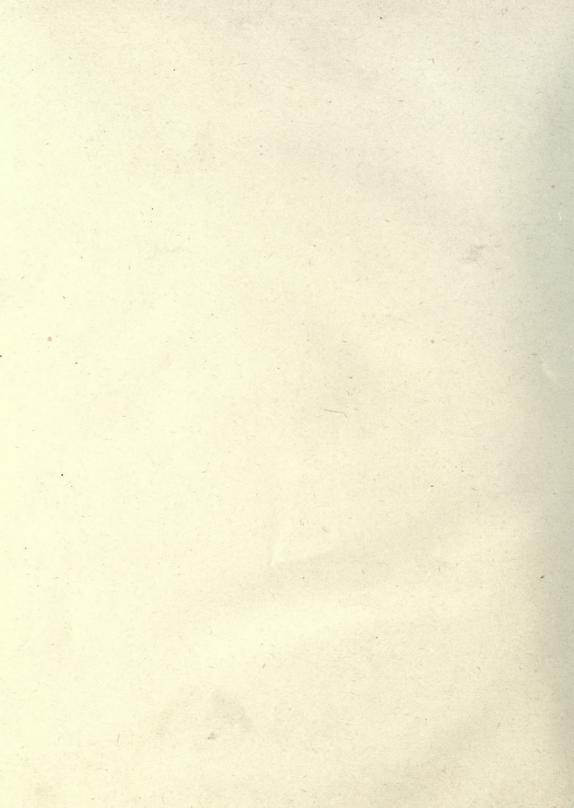


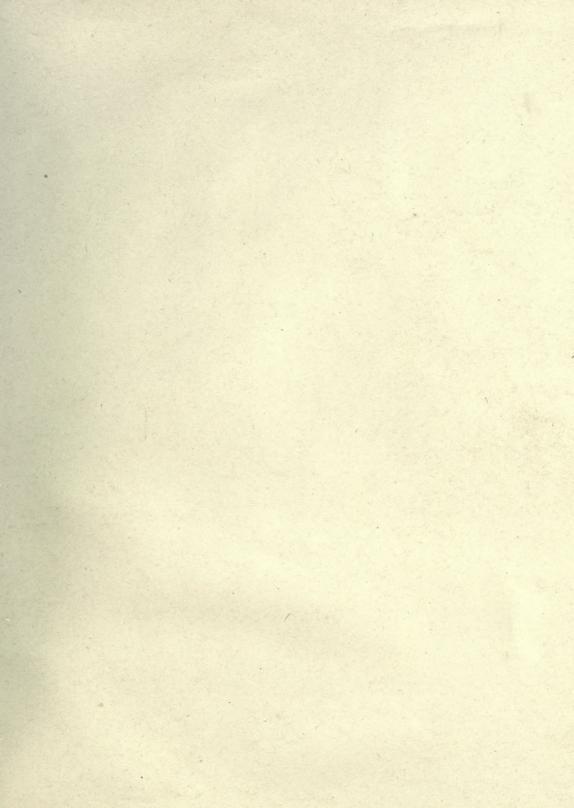


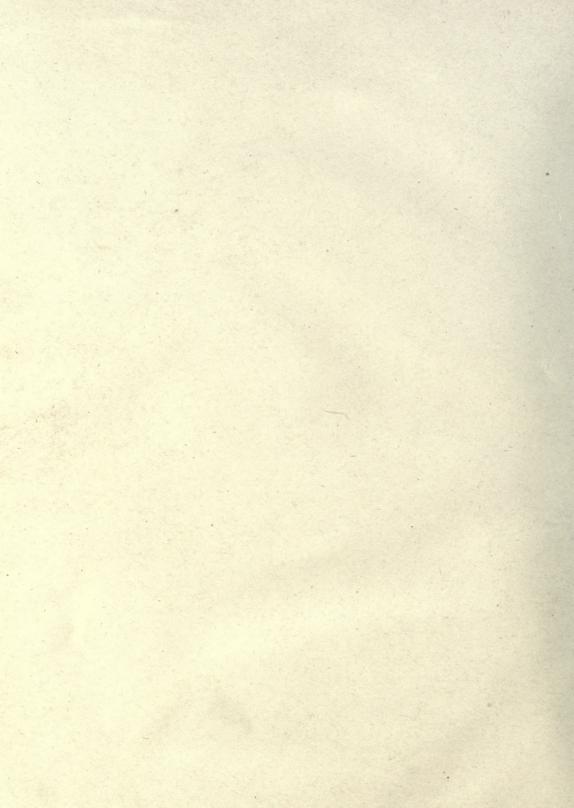


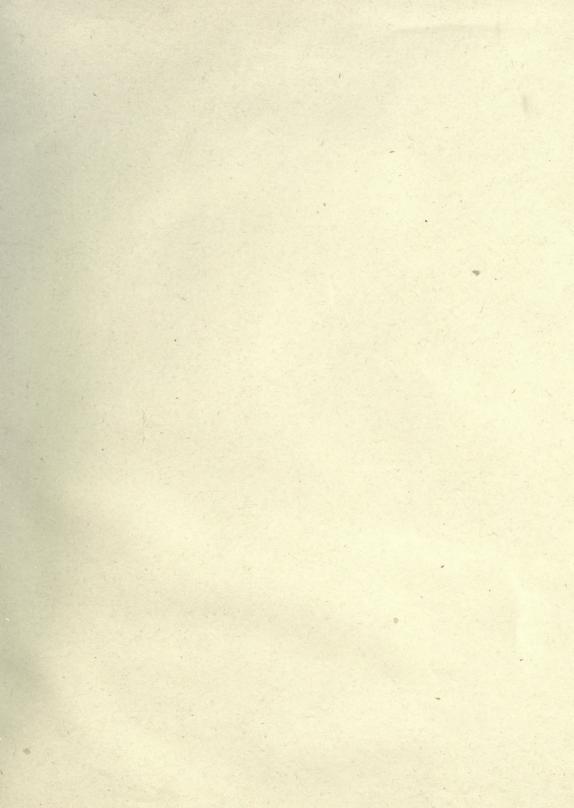


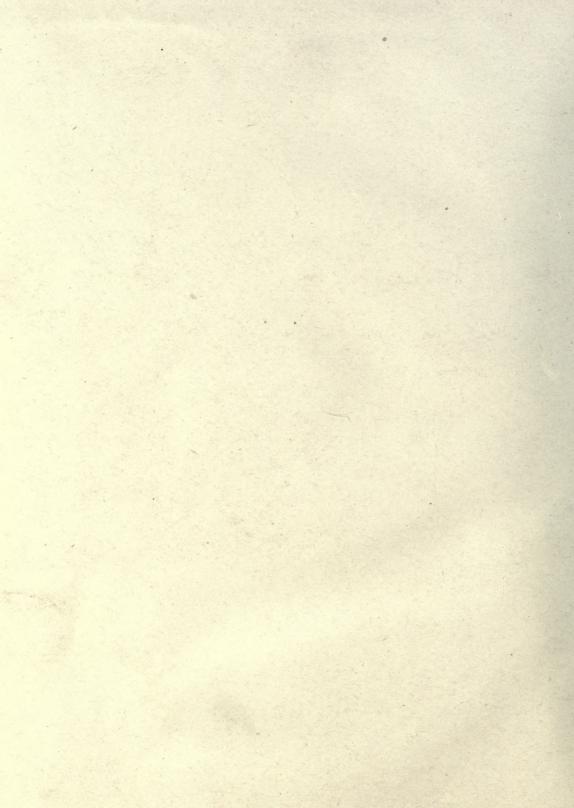


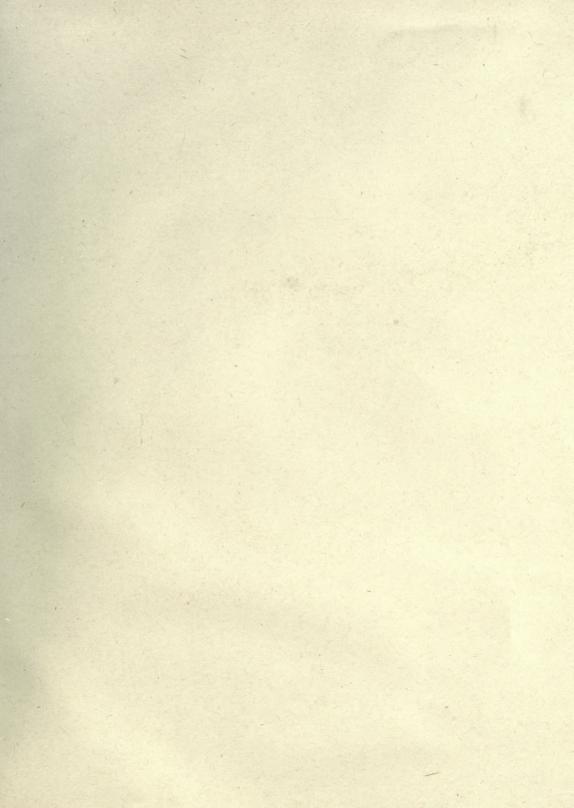


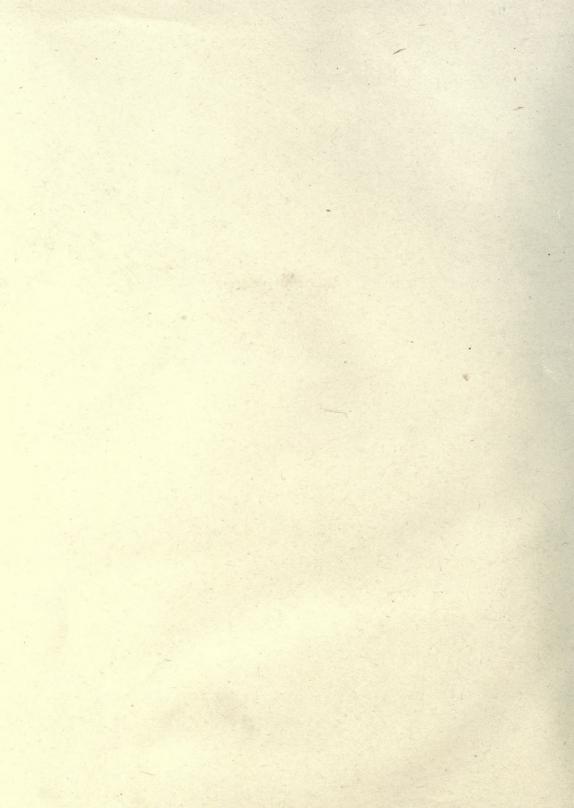


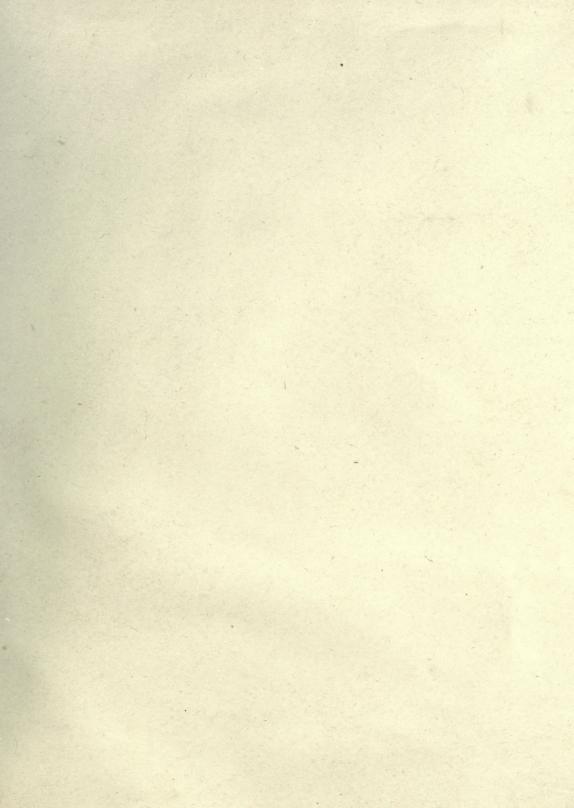


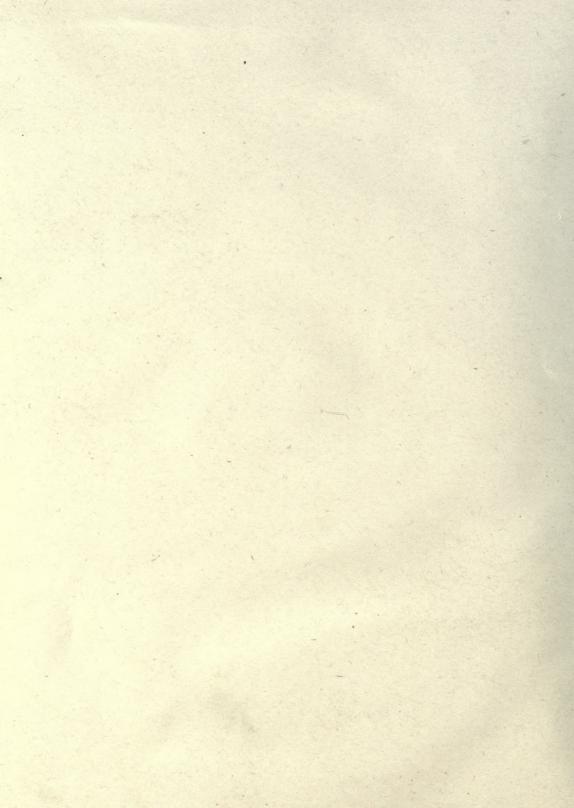


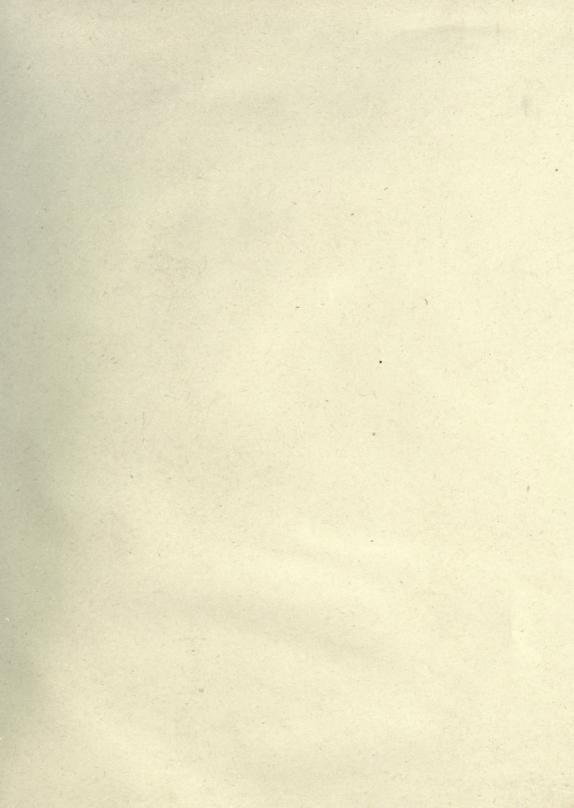


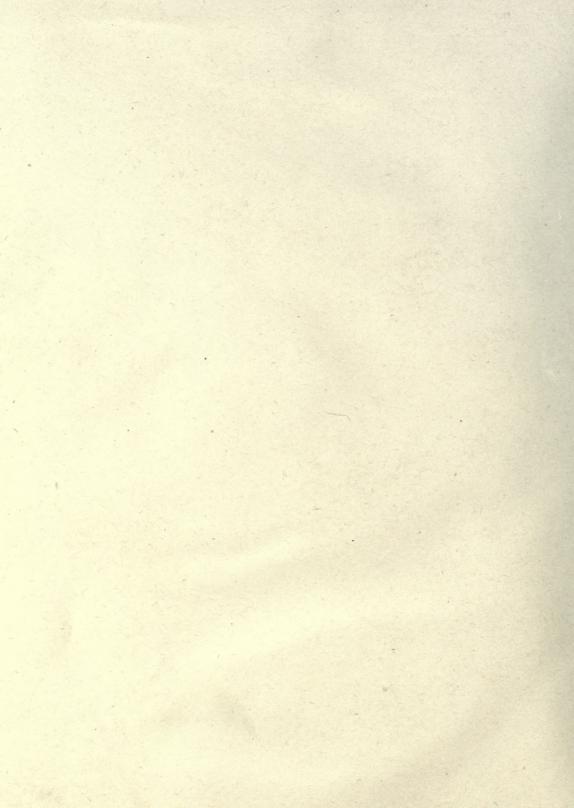


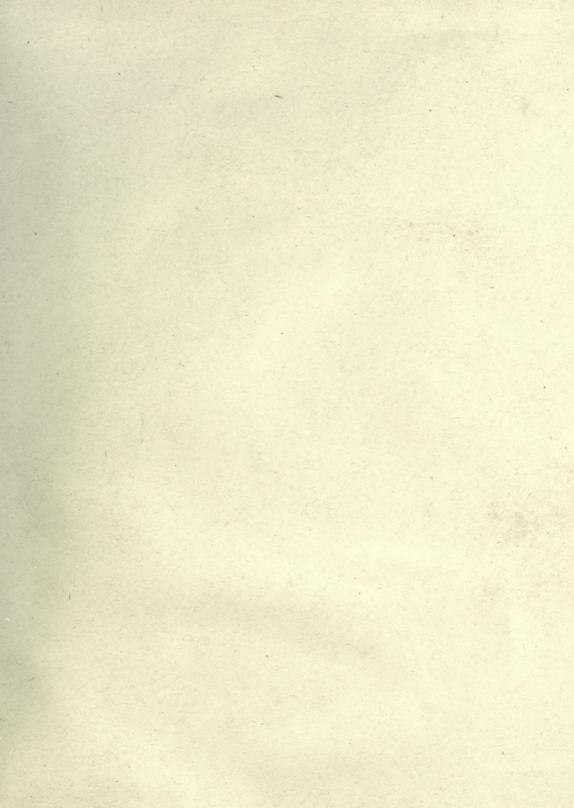


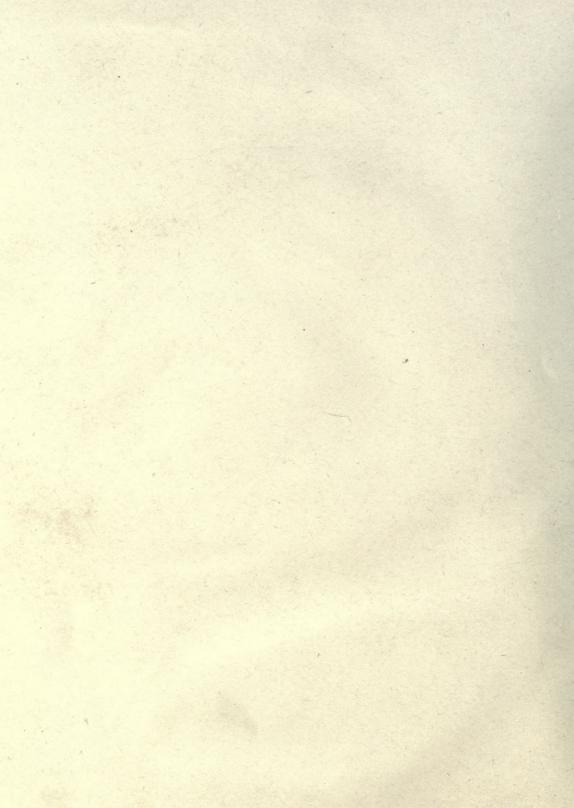


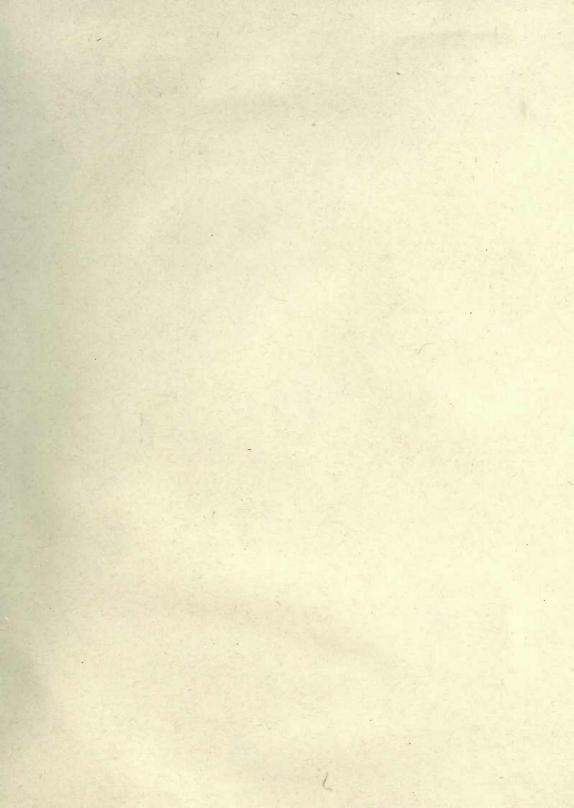


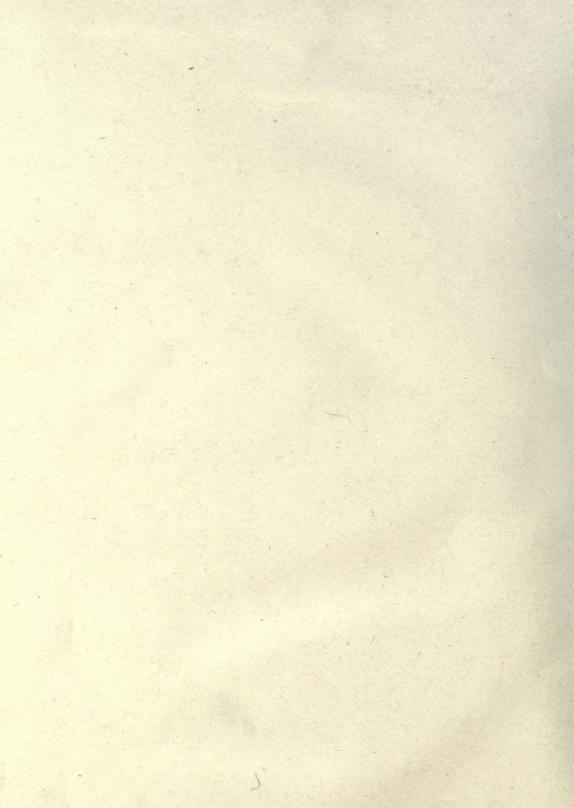


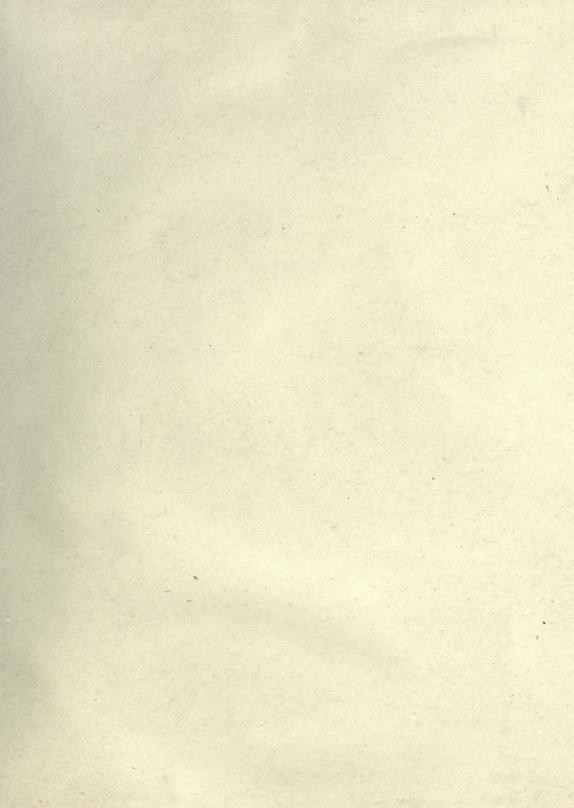


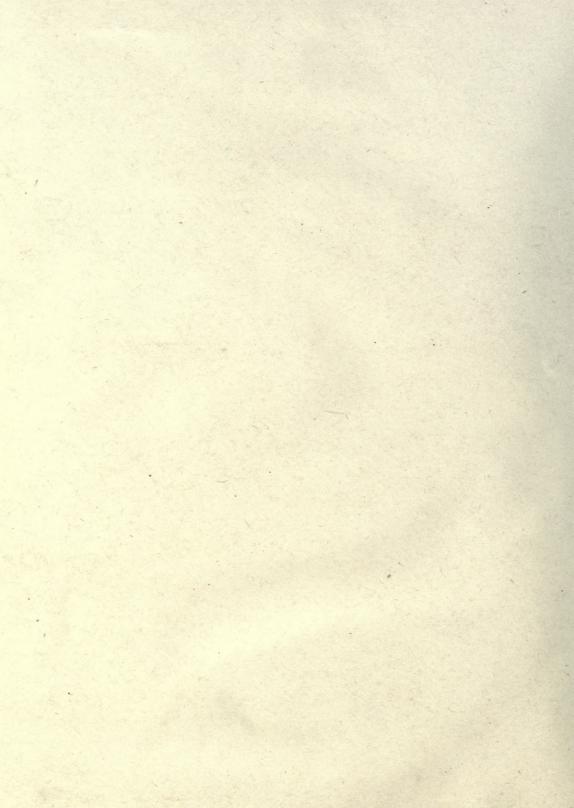


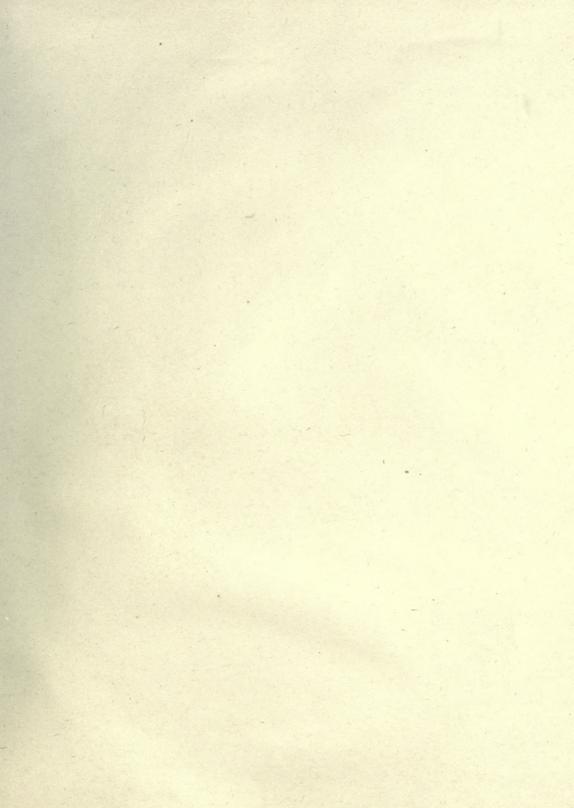




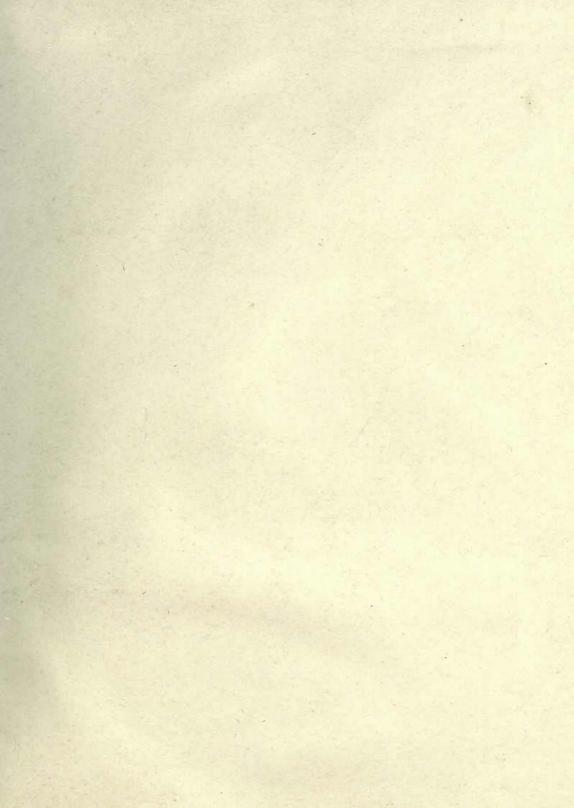


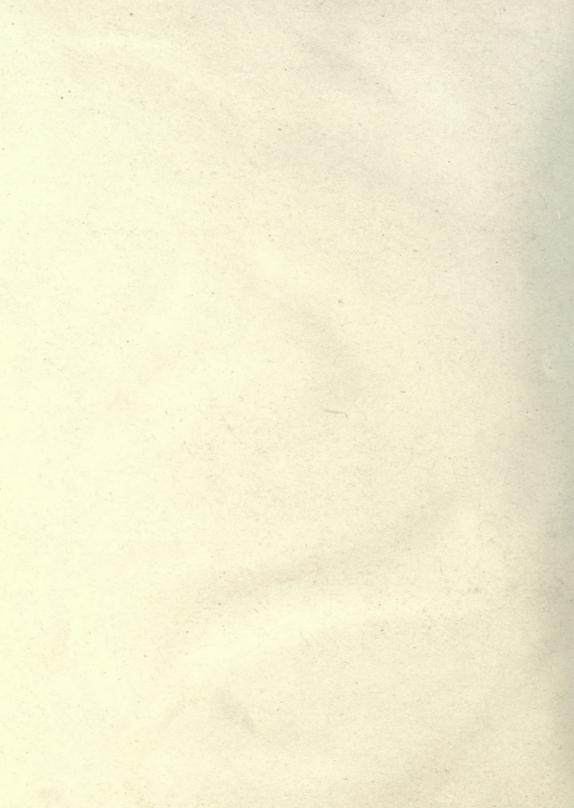


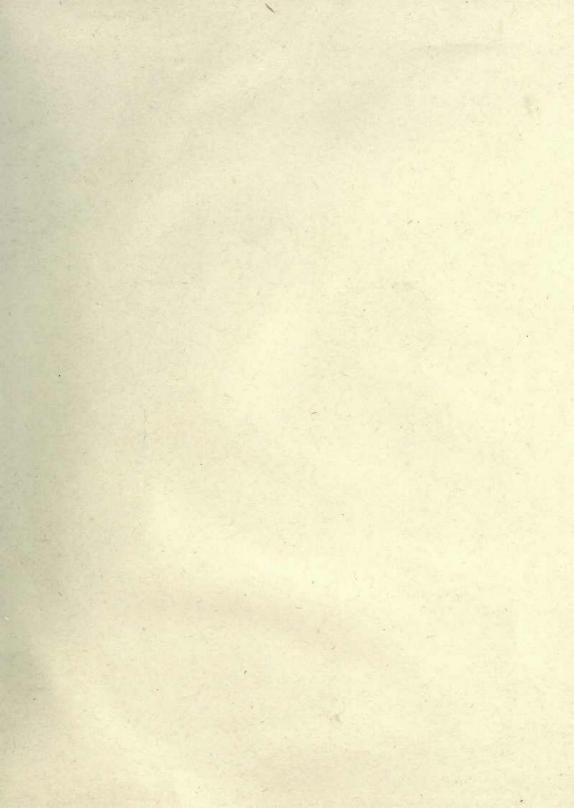


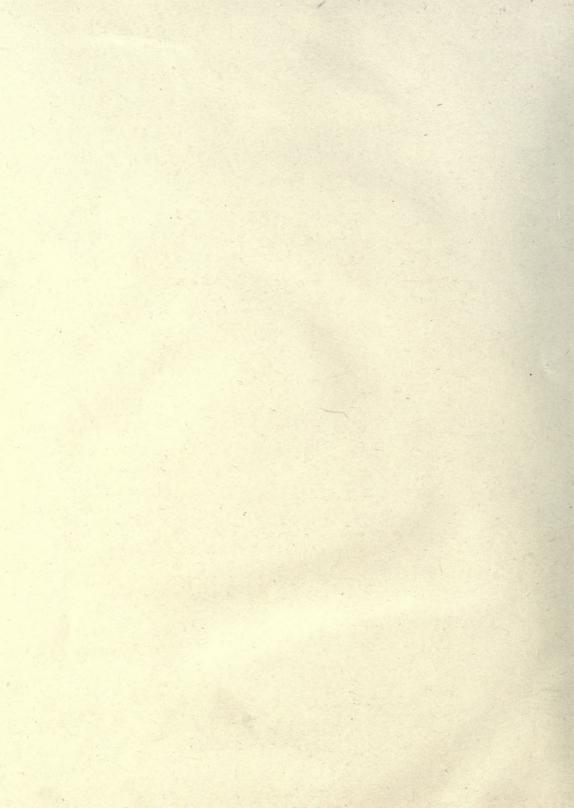


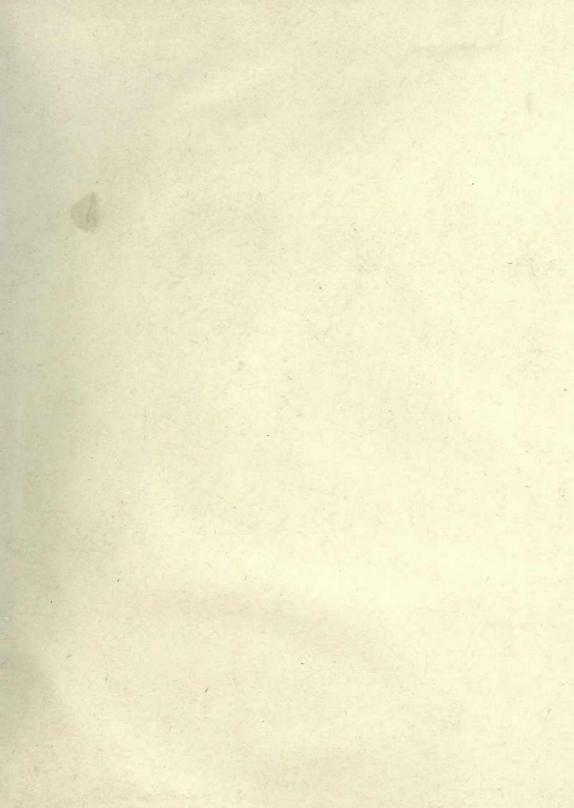


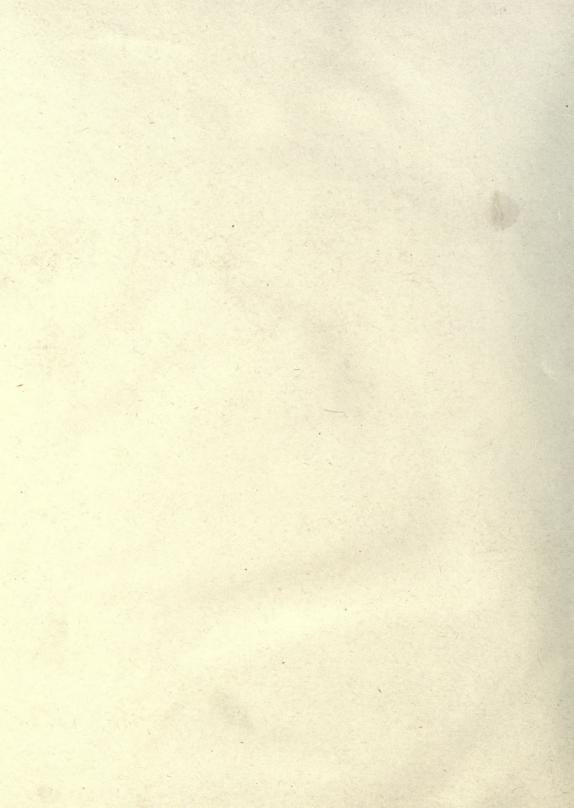


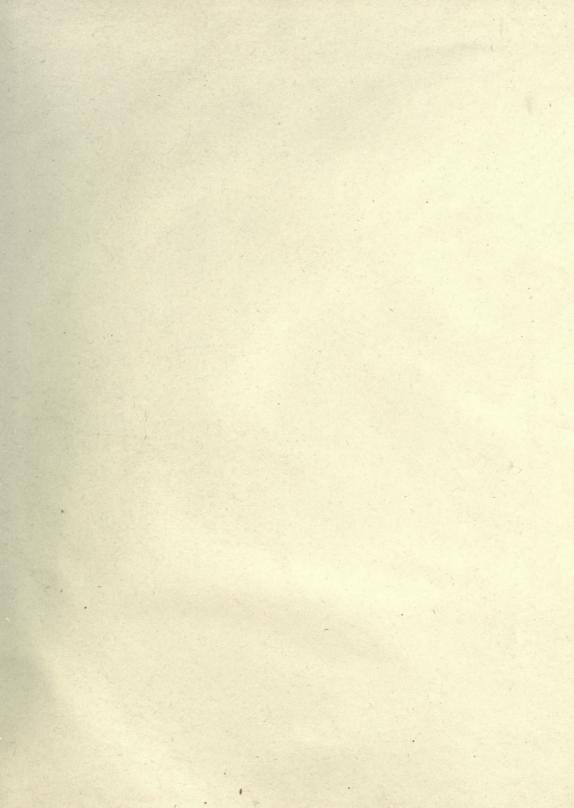


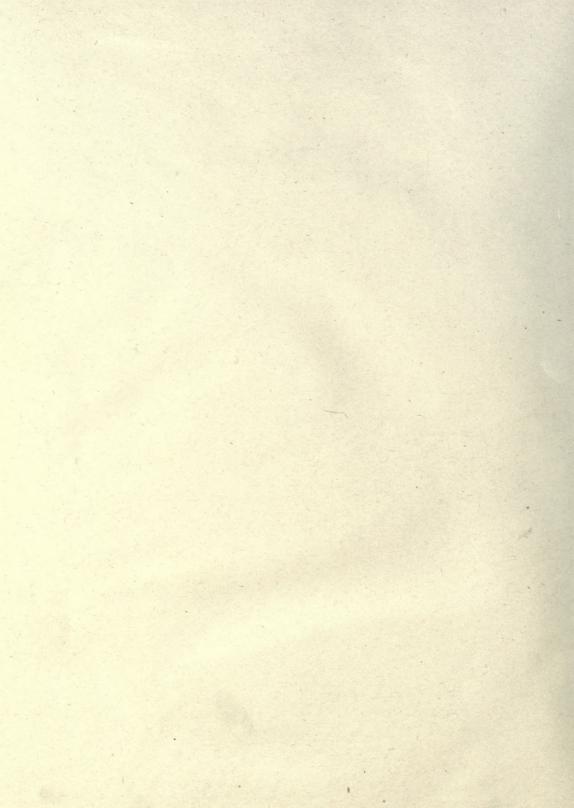


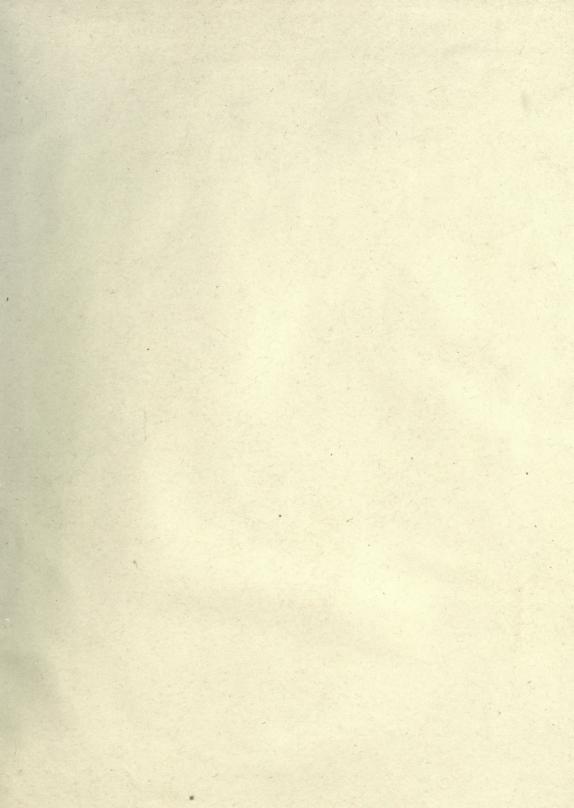


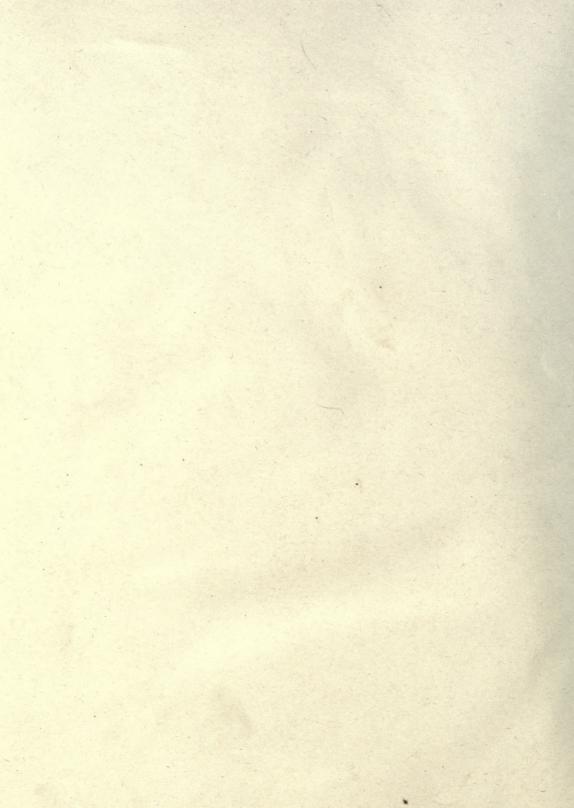


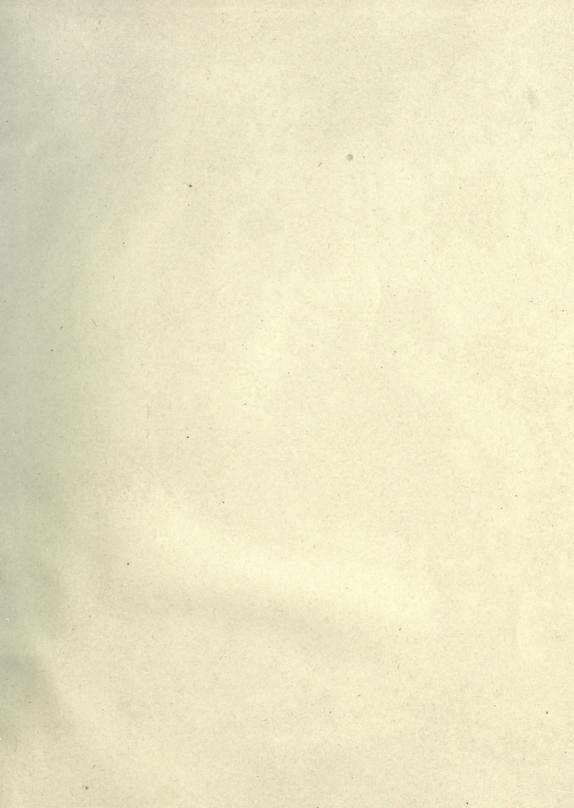


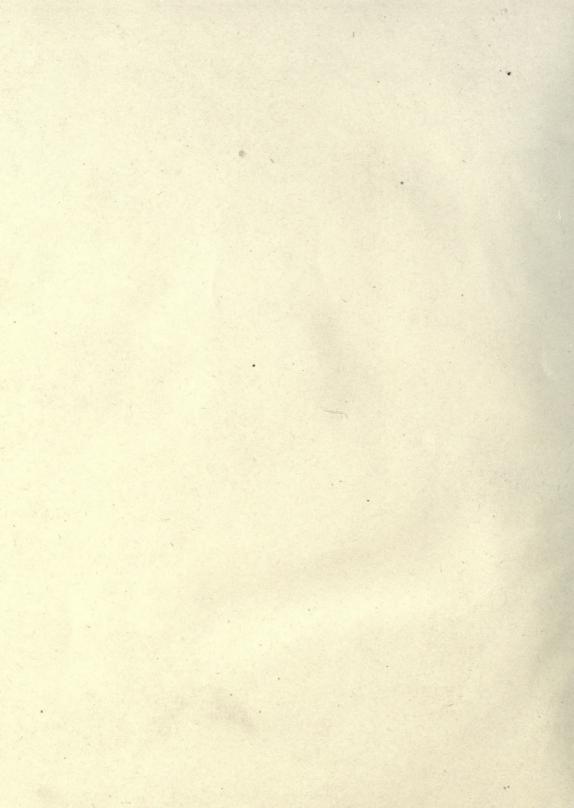


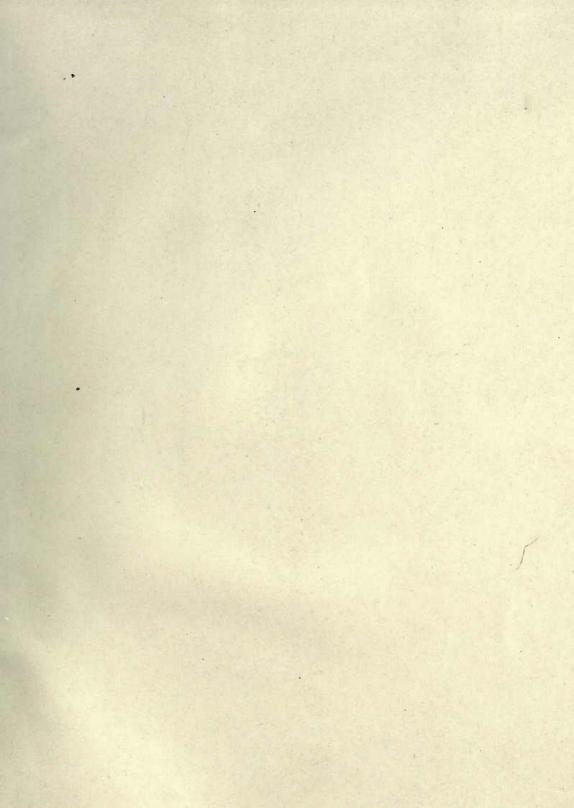


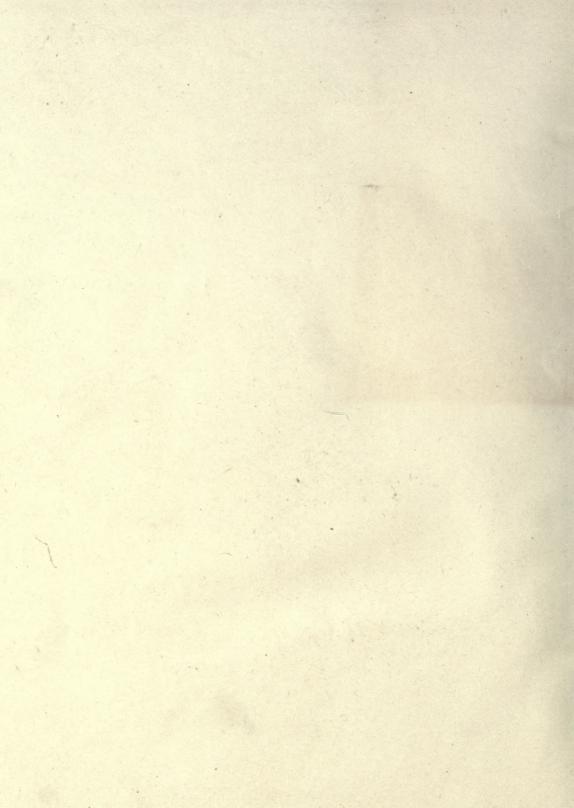












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