### Tables for Excavations and Embankments

**DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.**

Roadway 18 feet wide. Side Slope 1 to 1.

For Single Track Excavation.

*Copyright, 1895, by Keuffel & Esser Co.*

<table>
<thead>
<tr>
<th>0</th>
<th>.1</th>
<th>.2</th>
<th>.3</th>
<th>.4</th>
<th>.5</th>
<th>.6</th>
<th>.7</th>
<th>.8</th>
<th>.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>9.0</td>
<td>9.1</td>
<td>9.2</td>
<td>9.3</td>
<td>9.4</td>
<td>9.5</td>
<td>9.6</td>
<td>9.7</td>
<td>9.8</td>
</tr>
<tr>
<td>1</td>
<td>10.0</td>
<td>10.1</td>
<td>10.2</td>
<td>10.3</td>
<td>10.4</td>
<td>10.5</td>
<td>10.6</td>
<td>10.7</td>
<td>10.8</td>
</tr>
<tr>
<td>2</td>
<td>11.0</td>
<td>11.1</td>
<td>11.2</td>
<td>11.3</td>
<td>11.4</td>
<td>11.5</td>
<td>11.6</td>
<td>11.7</td>
<td>11.8</td>
</tr>
<tr>
<td>3</td>
<td>12.0</td>
<td>12.1</td>
<td>12.2</td>
<td>12.3</td>
<td>12.4</td>
<td>12.5</td>
<td>12.6</td>
<td>12.7</td>
<td>12.8</td>
</tr>
<tr>
<td>4</td>
<td>13.0</td>
<td>13.1</td>
<td>13.2</td>
<td>13.3</td>
<td>13.4</td>
<td>13.5</td>
<td>13.6</td>
<td>13.7</td>
<td>13.8</td>
</tr>
<tr>
<td>5</td>
<td>14.0</td>
<td>14.1</td>
<td>14.2</td>
<td>14.3</td>
<td>14.4</td>
<td>14.5</td>
<td>14.6</td>
<td>14.7</td>
<td>14.8</td>
</tr>
<tr>
<td>6</td>
<td>15.0</td>
<td>15.1</td>
<td>15.2</td>
<td>15.3</td>
<td>15.4</td>
<td>15.5</td>
<td>15.6</td>
<td>15.7</td>
<td>15.8</td>
</tr>
<tr>
<td>7</td>
<td>16.0</td>
<td>16.1</td>
<td>16.2</td>
<td>16.3</td>
<td>16.4</td>
<td>16.5</td>
<td>16.6</td>
<td>16.7</td>
<td>16.8</td>
</tr>
<tr>
<td>8</td>
<td>17.0</td>
<td>17.1</td>
<td>17.2</td>
<td>17.3</td>
<td>17.4</td>
<td>17.5</td>
<td>17.6</td>
<td>17.7</td>
<td>17.8</td>
</tr>
<tr>
<td>9</td>
<td>18.0</td>
<td>18.1</td>
<td>18.2</td>
<td>18.3</td>
<td>18.4</td>
<td>18.5</td>
<td>18.6</td>
<td>18.7</td>
<td>18.8</td>
</tr>
<tr>
<td>10</td>
<td>19.0</td>
<td>19.1</td>
<td>19.2</td>
<td>19.3</td>
<td>19.4</td>
<td>19.5</td>
<td>19.6</td>
<td>19.7</td>
<td>19.8</td>
</tr>
<tr>
<td>11</td>
<td>20.0</td>
<td>20.1</td>
<td>20.2</td>
<td>20.3</td>
<td>20.4</td>
<td>20.5</td>
<td>20.6</td>
<td>20.7</td>
<td>20.8</td>
</tr>
<tr>
<td>13</td>
<td>22.0</td>
<td>22.1</td>
<td>22.2</td>
<td>22.3</td>
<td>22.4</td>
<td>22.5</td>
<td>22.6</td>
<td>22.7</td>
<td>22.8</td>
</tr>
<tr>
<td>14</td>
<td>23.0</td>
<td>23.1</td>
<td>23.2</td>
<td>23.3</td>
<td>23.4</td>
<td>23.5</td>
<td>23.6</td>
<td>23.7</td>
<td>23.8</td>
</tr>
<tr>
<td>15</td>
<td>24.0</td>
<td>24.1</td>
<td>24.2</td>
<td>24.3</td>
<td>24.4</td>
<td>24.5</td>
<td>24.6</td>
<td>24.7</td>
<td>24.8</td>
</tr>
<tr>
<td>16</td>
<td>25.0</td>
<td>25.1</td>
<td>25.2</td>
<td>25.3</td>
<td>25.4</td>
<td>25.5</td>
<td>25.6</td>
<td>25.7</td>
<td>25.8</td>
</tr>
<tr>
<td>17</td>
<td>26.0</td>
<td>26.1</td>
<td>26.2</td>
<td>26.3</td>
<td>26.4</td>
<td>26.5</td>
<td>26.6</td>
<td>26.7</td>
<td>26.8</td>
</tr>
<tr>
<td>18</td>
<td>27.0</td>
<td>27.1</td>
<td>27.2</td>
<td>27.3</td>
<td>27.4</td>
<td>27.5</td>
<td>27.6</td>
<td>27.7</td>
<td>27.8</td>
</tr>
<tr>
<td>19</td>
<td>28.0</td>
<td>28.1</td>
<td>28.2</td>
<td>28.3</td>
<td>28.4</td>
<td>28.5</td>
<td>28.6</td>
<td>28.7</td>
<td>28.8</td>
</tr>
<tr>
<td>20</td>
<td>29.0</td>
<td>29.1</td>
<td>29.2</td>
<td>29.3</td>
<td>29.4</td>
<td>29.5</td>
<td>29.6</td>
<td>29.7</td>
<td>29.8</td>
</tr>
<tr>
<td>21</td>
<td>30.0</td>
<td>30.1</td>
<td>30.2</td>
<td>30.3</td>
<td>30.4</td>
<td>30.5</td>
<td>30.6</td>
<td>30.7</td>
<td>30.8</td>
</tr>
<tr>
<td>22</td>
<td>31.0</td>
<td>31.1</td>
<td>31.2</td>
<td>31.3</td>
<td>31.4</td>
<td>31.5</td>
<td>31.6</td>
<td>31.7</td>
<td>31.8</td>
</tr>
<tr>
<td>23</td>
<td>32.0</td>
<td>32.1</td>
<td>32.2</td>
<td>32.3</td>
<td>32.4</td>
<td>32.5</td>
<td>32.6</td>
<td>32.7</td>
<td>32.8</td>
</tr>
<tr>
<td>24</td>
<td>33.0</td>
<td>33.1</td>
<td>33.2</td>
<td>33.3</td>
<td>33.4</td>
<td>33.5</td>
<td>33.6</td>
<td>33.7</td>
<td>33.8</td>
</tr>
<tr>
<td>25</td>
<td>34.0</td>
<td>34.1</td>
<td>34.2</td>
<td>34.3</td>
<td>34.4</td>
<td>34.5</td>
<td>34.6</td>
<td>34.7</td>
<td>34.8</td>
</tr>
<tr>
<td>26</td>
<td>35.0</td>
<td>35.1</td>
<td>35.2</td>
<td>35.3</td>
<td>35.4</td>
<td>35.5</td>
<td>35.6</td>
<td>35.7</td>
<td>35.8</td>
</tr>
<tr>
<td>27</td>
<td>36.0</td>
<td>36.1</td>
<td>36.2</td>
<td>36.3</td>
<td>36.4</td>
<td>36.5</td>
<td>36.6</td>
<td>36.7</td>
<td>36.8</td>
</tr>
<tr>
<td>28</td>
<td>37.0</td>
<td>37.1</td>
<td>37.2</td>
<td>37.3</td>
<td>37.4</td>
<td>37.5</td>
<td>37.6</td>
<td>37.7</td>
<td>37.8</td>
</tr>
<tr>
<td>29</td>
<td>38.0</td>
<td>38.1</td>
<td>38.2</td>
<td>38.3</td>
<td>38.4</td>
<td>38.5</td>
<td>38.6</td>
<td>38.7</td>
<td>38.8</td>
</tr>
<tr>
<td>30</td>
<td>39.0</td>
<td>39.1</td>
<td>39.2</td>
<td>39.3</td>
<td>39.4</td>
<td>39.5</td>
<td>39.6</td>
<td>39.7</td>
<td>39.8</td>
</tr>
<tr>
<td>31</td>
<td>40.0</td>
<td>40.1</td>
<td>40.2</td>
<td>40.3</td>
<td>40.4</td>
<td>40.5</td>
<td>40.6</td>
<td>40.7</td>
<td>40.8</td>
</tr>
<tr>
<td>32</td>
<td>41.0</td>
<td>41.1</td>
<td>41.2</td>
<td>41.3</td>
<td>41.4</td>
<td>41.5</td>
<td>41.6</td>
<td>41.7</td>
<td>41.8</td>
</tr>
<tr>
<td>33</td>
<td>42.0</td>
<td>42.1</td>
<td>42.2</td>
<td>42.3</td>
<td>42.4</td>
<td>42.5</td>
<td>42.6</td>
<td>42.7</td>
<td>42.8</td>
</tr>
<tr>
<td>34</td>
<td>43.0</td>
<td>43.1</td>
<td>43.2</td>
<td>43.3</td>
<td>43.4</td>
<td>43.5</td>
<td>43.6</td>
<td>43.7</td>
<td>43.8</td>
</tr>
<tr>
<td>35</td>
<td>44.0</td>
<td>44.1</td>
<td>44.2</td>
<td>44.3</td>
<td>44.4</td>
<td>44.5</td>
<td>44.6</td>
<td>44.7</td>
<td>44.8</td>
</tr>
<tr>
<td>36</td>
<td>45.0</td>
<td>45.1</td>
<td>45.2</td>
<td>45.3</td>
<td>45.4</td>
<td>45.5</td>
<td>45.6</td>
<td>45.7</td>
<td>45.8</td>
</tr>
</tbody>
</table>

Calculated by Julien A. Hall, M. Am. Soc. C. E.
V.S.O.

9-15-54

These are the exact results.

Two entries were made in the
Woodbridge area - most in
the small boxes called Retrieval.

2.

16ga gun made by Meriden Arms Co.
MERIDEN, CT, PATD. JULY 9, 1907.
NO. ON FORE PLATE 71142
BELOW FIRING PIN -- RIGHT SIDE 9
LEFT SIDE 530 - 71142

22L CAL. RIFLE - SINGLE SHOT - GERMAN MADE
DEUTSCHE WERKE - WERKE ERFURT.
RIGHT SIDE - BELOW SIGHT - DRP GERMANY.

ONTOPOF BARREL

UNDER BARREL 2 800 5.5mm
3541V

22 CAL. SHORT-REPEATING RIFLE
MOD. BY WINCHESTER ARMS CO.
NEW HAVEN, CONN. U.S.A. PATENTED JUNE 26, 1892
DEC. 29, 1906 -- MOD. 1906
ON SIGHT PAT. JAN. 29, 1906
ON STOCK - BACK OF TANNER -
WINCHESTER TRADEMARK.
1. UNDERBARREL - 4
   23

   59

   IN FRONT OF TRIGGER GUARD - 25.15
   " BACK " 11
   294.15

   Autumn

   FALL 1926 - 16 squirrels
   14 quails

   Summer - building nest
   end of July

   1928 - My first 17 year locust year.
   Only the thrill of a lifetime. Countless
   millions of soft white bugs crawling
   everywhere in sight, then pistachios
   many dry shrubs everywhere, and
   lastly, that stinky, mono-tonous,
   droning noise filling the whole countryside.
   Where does it all come from?
   What have they made of
   everything? Will it last but the 4 Rap sens?

   2. Spring 1928 -

      Pair of Buff Orioles arrived
      First in no. of years - nest un-
      discovered - birds constantly in
      garden - followed father up
      one of many trips to pines at Camp
      pigeon - Found one young male. 4 2
      females - large - were near house for
      several days, then disappeared
      Once or twice on rainy days.
      Once in site duty all 5 returned and
      destroyed 3 large nests of small green
      tent caterpillars in multiflora & gooseberrry
      bushes - Gone again.

   3. Aug. 12, 1928 - Kissed 8th snake of season
   Eastern black - 5 water moccasins
Sand moccasins — and 2 giant black or blue racer.

1920 Record — 13 snakes — only one escaped in macaunahahcy of suit.

...Thus far (until Aug. 8) 4 have escaped — one badly crippled.

Indigo Bunting — first observed about 3 yrs. ago at Blue. — nest this yr. (1928) on path around — didn't find nest for fear of frightening any bird — daily standing on top of hill by dead tree, fluttered ahead, chirping, to top of hill where he would fly out into the field.

Bunting unseen for about 2 yrs. — reappeared about end of July — singing happily.

Children raised & worries of father had assuaged. I expect — Good cause to be happy!

We have 8 fine chicks which...
Sept. 1928 - Requiem

Sept. - Maker and make keb under faller
Total 9 lobe

Oct. 1929 - Killed long black snake coyote.

Total:

Rag story: has heard one:

Nov. 1. Wished a little open nose, one of something that some his
knew and long ago one day:
Long tail slightly twisted, short feathers
Eye, feather, ear, etc.

Make a closeup.

Description: Upper half red
Brown, like English curve
Stomach - greyish white
Reddish brown or black

Division each side of a white line through to
afraid, from hill back to neck.

On each check is a
light white pigmented with
brown yellow patches in
front, yellowy yellow near
eye, and very palmar area
area, with black, thin line collar around throat. All short,
not heavy thin.

First seen in pine trees
Singing, and Hardy walking
in a shade, from the top
down into a pen bush and
soon up into a sand.

Reddish brown of eyes.

About size of Eng, Fogg, new

Yup.

White hair in wings. The
back is a clear red-brown
in some cases not wetter, white throat Spanier.
Nov 28, 1938. Identified Carolina wren today. Plucking them along path to meadowland in brush pikes, in wood and field. There have been living here for years. We also saw long-scouting bird of marsh, wren in marsh by pond. And house wren. Then later the were eagerly received. They have nested here every year since "way back when." There is up the city, wren that I have seen. Ball branch, and was seen beautifully, in a voice out of all proportion to their size; clay, still. Including these are either Carolina or long-billed marsh wrens.

Another newly-found friend this year is the blackbird. We got many a good meal out of the wild cherry trees in front of the house. Though I saw an orchard oak this year but not sure. However we saw a summer tanager many times (uncharacter). I have taken especial notice this year of the large flock of two birds traveling around in the woods. What a system they have! From the little downy woodpecker, down through all the warblers, thrushes, creepers, to the turkeys covered by these bands. Each has his special type of work to do, and they creep rapidly through the woods, cleaning out the insects as they go. They have a regular route left time and return at regular intervals. Many of them were old friends known or unknown, but many I did not remember seeing before.

One was either a blackpoll warbler or a black-throated crested. He was in a flock I saw in mid-summer, while waiting for a band.
Jan 6, 1929. Went out with dogs on Sat. Dec 16, 1928; killed rabbit in field by divided tree near woods while dogs hunted in thicket, then went up road. The puppy soon came out I was trailing around, Teddy picked up the trail, dashed off across the woods trailing silent. The puppy followed real slick and I hunted the brushy plot. Teddy planted back quietly away off as the hare was back into thin air. I went on over, getting there about 10 mins later. I broke thru the rim of wires, into a clearing of small trees. Teddy whipped around thru his hind legs, taking when he saw me. A big red fox was facing him across a fallen log. When he saw me he darted away and I snapped up the gun. I shot, just as Teddy closed in. I jumped on him. He shook.
although the scale is usually off. His tail was 20" long, and over 15" around at the largest part. He was a perfect specimen, deep red, with black nose, ears, and legs, and a white tip on his dark tail. His ears were deep black on the outside, and snow white inside.

When shrimping Carl cut off the lowest part of his legs, but Parks skinned him. I saved them. The fish companies quote Red Foxes high as $40.00. Mrs. McKinnon offered to pay me more than any fox. I sold them for a varying price. I might get. Many went into him too.

That evening I went out and killed another rabbit. Carl had enjoyed it. I dug it up, since then I have killed more rabbits having about 10. Also have had a sparrow and captured another who got on old gum. I've seen that (3).

For Christmas I received a book of Birds, Annual, Xmas pictures, with descriptions, by R. Bruce, 

for Christmas I received a book of Birds, Annual, Xmas pictures, with descriptions, by R. Bruce, and 13 (or rather) nature pictures from Peggy; a rabbit picture (from Peggy), a picture "He Appeal to the Spirit," a bedroom, a room with a bed, a room with a baby's chair, 18" and 2 pair of pajamas.

On Sat Jan 29, Mary brought off a car of 36 "beaver tails (Cumby Brand) from Racquet's. I paid 13.50 for them, reduced from 25.00. I went downtown to the river and watched a flock of drake deer. In the river on the path to the road I found a flock of chickens. I think there were six white, six black, but around
as small as the never-beaten shingle.

I’ve been reading lately animal stories in “American” by A. P. DeHaven, A. Audubon, Rachef (or Rachef).

Mr. Sam Rayburn from Cottageville, W. V., flew a C-1276, followed by a twin-screw, three-rotor, with long kind of windows.

Watching sharp-shinned hawks.

This was on Jan. 5, 1938. Saturday.

1938 – Saturday

Drew sitting out in the back garden this evening about 10:30, listening to the bluebirds of state. No singing and the sparrows chirping, and how marvelous the wonderful fretting weather, when I heard a whooping sing. Looked around and saw a pretty little green canary, but a bird which appeared to be singing, nearby. I couldn’t see him. He flew from the fence to one of the posts, passing beautifully.

Then flew down between the college rows (where strawberries were) and walked along, a few inches behind the canary. I watched him thru the living window, until he flew over to the canopy.

He was a dark rust-red on his back, which had a sort of speckled, sandy appearance, not smooth.

On his cheek was a triangle covering the side of his head of a lighter brown, with the back towards the hill of the eye near the ear. His entire chest and underparts were heavily spotted, but distinctly, with rust-red splatters, and he had a heart shaped patch the same color in the middle of his chest, over the wind-stone. All of the spots were clear cut on his flight feathers. His only mate was a sort of chip. He walked very alert and sprightly.

Fox Sparrow – Jan. 13, 1938
I rode over to the wake-house with Mr. Hammond on the truck, saw Peggy a minute & walked down the hill.
On the last train above Ockoun, I was delayed with a consignment number of chickens, hens & hatchets. Their other friends were gone in the other train, but there were the ones that conspired to drop almost a quart of dried peas all over, all of them left the train but one little fellow who chased down a cow & followed it to the ground, keeping under it several times, then lighting in the road for a second. I just recognize them definitely as old friends. These hens brought them back clearly.

Fri. 25 - Jan. 1929 - Missed Ipa. -
mid-year today, temp. 8018
grew up.
Sat. 26 - Stayed inside all day.
Sat. 26 - Jan. Saw a flock of seaplanes or amphibian thing coming before noon. It came directly over the house, very low. The boat body was black, and the skeleton framework appeared very funny. The number was 92.85. I thought I had it written down somewhere: At a distance only the big boat, the 2 small pontoons & the 2 small engines appeared clearly, the wings double hull of the supporting framework being almost invisible. It was the same type as the one in which "Gene" Tunney flied from Seattle over the Hudson to N.Y. City.
Feb. 5, 1929 - Tuesday.

Had Monday off and just got back to school after a 3 day rest. I came home on 3/1 this evening (4:10), rode as far as Homer’s lane with “Bud” Sally in “Baby” truck. I was kept up further near the lower gravel pit. At short ways this side of it I heard a faint “tug.” I saw a tiny golden-browed kinglet flying about in the brush, grass & tiny junces alongside the road. He never got more than 2 ft. above the ground. He let me clinch up the branch towards arm’s reach of him, without paying any attention to me. He flew down the road into belemnite woods. I followed along the road watching. He then flew up over the high bank onto Bubba’s field, stopping by the gravel pit first to water, me watch up for the other good luck, while he fed in a little pine bush.

2 ft. high. On account of my clothes I couldn’t follow him. He seemed to be all alone, although I heard him chipping amongst large groups of sparrows in Bubba’s woods a few yards away. He seemed only slightly longer than the tiny hummingbird, although Blanchard says 4 1/4-2 1/2 inches. It was rather cold but he acted happy and contented, also very much unperturbed, even friendly.

March 11, 1929 - Saturday.

Today was very pleasant day in the woods. After bringing out the cows I stopped by the gate and watched the birds at work. There were about a dozen flickers, about the same number of yellow-billed sparrow, and about 6 or 8 downy and hairy woodpeckers. One capuchin went around a young Hickopus, darting his bill...
Oct. 27 - Worked quite a while at sawing in the yard today, hammering in the fence by the fire, and putting on the screen door.

Friday 29 - Went to town to see about buying a new suit. Arrived home, didn't stay long as I had to get work done.

Mar. 19 - Sunday

One swallow was in the yard today, hammering on the fence. I don't think that helps.

Mar. 23 - Saturday

This was a quiet day. Spent some time in the garden, picking up the flowers that had fallen. The bees were busy in the honeycomb. The sun was bright in the sky, but the air was still, with no wind to move it.

Sun. 31 - Had to get out this afternoon to work. Had to go to the store to buy some supplies. The weather was nice, with a slight breeze.
Jan 25 1930 - At school I had a swell time.

Mar 13 - I went to see the play, "I, Claudius." The actors were very good, in fact, of the acting I gave the "I, Claudius." There were many of the scenes that were quite funny.

Mar 17 - The play was very interesting. The scenes were well executed. The only scene that I found was just part of the play.

Apr 10 - It was a very interesting play. The scenes were well executed. The only scene that I found was just part of the play.

May 4 - I saw a very good play. It was "I, Claudius." The scenes were very well executed. The only scene that I found was just part of the play.

June 14 - I saw a very good play. It was "I, Claudius." The scenes were very well executed. The only scene that I found was just part of the play.

Sep 3 - I went to see the play, "I, Claudius." The scenes were well executed. The only scene that I found was just part of the play.

Oct 1 - I saw a very good play. It was "I, Claudius." The scenes were very well executed. The only scene that I found was just part of the play.
Tuesday, April 20

We started about noon. Hills
are conspicuous near Biggler.

2nd make.

The sky was bright and clear.

The cloud was white and

We had a little breeze. The

water was a little bit

taller than the last.

Chaparral, 80 miles.

The hills were covered with

shrub and brush. The

fields were green.

The road was hilly.

The scenery was

beautiful.

X. 4

It was a lovely day. The

clouds were white. The sky

was blue. The sea was

充分发挥

the

mercy of God. Amen.
Sat 2 April.

To-day I went to the new outdoor skating rink.

Sat 3 April.

Tell Cal about the big fish in the lake. He wanted
a fish to catch in this coming spring.

Sat 10 April.

The fish I got a long distance away from the
lake, but Cal was late.
and one went thru his made about 2 in. from his head.

Dec. 21, 1921.
Went out about 12:15 got back about 3:30 am.
The woods were filled with birds, a small
The first thing I saw was a little bird in the leaves under some
small vines. He had a crested crown, blue black, and a dunly speckled
yellow

The strange thing is a Black-billed
Yellow-billed wren is seems to
come around the house.

I saw a few white thrashers &
some white-crowned sparrows
about several yards ahead. 
These
would be in sight once or twice
then get a lump, with their bill. 
This distance, and soon everyone
had gone in. This is one of the
most beautiful tappling

songs I have ever heard, short
the “it is”, Every brief color on the
wings was clearly and brightly defined.
They were perhaps a dozen chickens
around me. One was pale brown
aloon, with a much longer of the
plumage. He waved the white eye
of the white eye

I saw several black to white
creeping waspers. Every black
strip was jet black shining,
and every white one was snow
white. The contrasting 

lines make this bird as
one of the most beautiful birds
I have ever seen. His black leg
are long black bell hangings with
the rest of his costume. The white
little wing is unclaininging.

Another kind Christ classifies
as a white neck wren but later
decided was a male tappling
the last flighted off and

flighted. He seemed never to be
faintly, coming. The Least
Above the pond I saw a thrush
like the other blackbird, but I
couldn't tell for sure. I recall a bird
that looked like a thrush, but I can't recall its markings.

April 27 – Apr 27
I saw the first adult tanager.
Thursday 25 is the young apple bees
also saw the first bel-martin
that evening about 6:15. He was
in the plum tree, calling to let me
know he was back.

I saw the bel-martin again
today, and also a tanager in the
woods.

In the yard there is a beautiful
blue Chub, and bed. The entire
body is electric blue, the wings
are a little darker, and a number
of short stripes down the upper back.
His song is sweet, with high notes, in
short time at very frequent intervals.
I think he is the “Yellow
Waxbill.” He is common here.

I saw a Mistlethistle
in several spots near the
pond.
hurt today.
And then a little bird sang
"cheee, cheee, cheee," or "chee chee chee.
We used to call it his song." They
called, "Come here!" He was gold,
somewhat dark brown, with dark
tint and whitish underbody. The
head, breast, & breast were
gold, yellow-tinted wings. OK - 7/29/30

In the oak tree began a
warbler with olive back; gold
streaks; tiny gold spot in the
Cheek of Citizen. Should't see
his body very well, but I saw
white, yellow or gray with black
streaks. However, the way he was
a very warbler - 7/29/30.

On the way to Des Moines about
11:30 AM. Saw a pretty dog and looked
into the house by the house gate. There
was a pair of red-tails; when I
became implicated with last year
viper for the yard. There are the
first of the year.

a little farther a bee-monitor
sitting on the electric light wires over
the road. Still fairly near.
Saw a new house. I saw a
Maryland yellowthroat, the first
of the year.

A few months ago I found
the beautifully built golden nest of
the sparrow, in the arborvitae at Mr. Mahoney's
fence, where the other used to be.
Saw it here today, but no
snakes.

A wood thrush was eating in the
ground near the pond. He flew
out; one piece
transition ahead from family disappearing.

7/29,
warbler, Back olive, green, upper
back & sides mainly streaked with
dark; head nearly & continually waved
along the head, whitish. Ann the answered
him just below him. Kit + family (3/12)
on backyard.

warbler, plainer green, back wings
& tail. Brighter chest gold under, gray-tailed
of bread, heavily streaked with
black or red-brown. Sang
constantly - "Zheh-ghee, ghee-ghee,
ghee." Had bright brown tail, line thinner
eyes & curved brow of line under eye.
Crane-shaped neck, long & slender,
standing erect. Was near ground &
in trees. Annie Walker (5/19)

1st. Maryland Yellow-waxtail in
brushy edge of stream behind hill
by the house.
6d Catbird in swamp near
near the fields.

1st. near yellowwaxtail
7. always gray back, gray underneath.
7. Dall's yellow wagtail on freight-plum
kept near ground, in small bushes.
7. several cheniers near same place.
1st. wagtail on freight-plum - thin wing
7. till flow. Eating caterpillar on a stick.
6d. cheniers, which were slight,
7. henry bill.
7. seemed to have tiny back on hill. Did
7. seemed to have bristles at base of bill.

Tennessee Warbler (7) 7/27/72

Saw hundreds more bluejays
going north in quick flock. Some at
back took. About 50 in one group
s. They left in tremendous fly back
Algeron or so from the field.

Algeron or so stay behind us.

May 7, Sat.

Heard a yellow-billed cuckoo
this A. appl. about 7:00. Will be welcome.

The tent catspillers are one of everything.
Killed a water-snake at pasture.
6th. about 2:15 or 2:30. The shots almost
made them move moderately to depth. They
dived into their underwater holes
like shots going under the bank.
Another water-snake got away.
All the swallows, and the swifts
also are here now.

A bluebird has a nest in

Mrs. Metzger's Star House.
A cardinal has a nest in a tree
about 4 ft. from the ground on the west
of the house. There were 3 eggs, white,
June 18. 1930.

Heavily splattered with chocolate.

May 5.

Saw another pair of beautiful bobolinks in the bushes. These warblers had gold hidden under plumage, silver and black, yellow back and wings. Overhead, green and black. Wings black with white base. Yellow, black throat a streak plus the white chins and underparts. Black throat, green warbler.

Two doz. warblers worked long, flew, hovered, - all of gold - yellow, white, blue, green, black, - call "quack - quack" - very loud. Was just a medley of things to see and hear. What a wonderful warbler. Great Crested Flycatcher. To mention one.

Warbler, olive green, back purple, yellow throat, upper chest, black line around throat. Dark red - white underparts. Kentucky warbler.

One warbler like the meadowlark but.

Had black wings instead of solid black breast \\

and white sides; round wings white. \\

throat clearly defined by black \\

stripes at bottom. Slim. The \\

stripes puzzle me. Must be myth.

July 29. 1930

One water-bird at pond. Sandy \\

pepper - salt flacked back \\

white underparts long bill. \\


disturbed. Lesser Banded Pipit. 17/30

The best I have ever seen. It was on land, not much, \\

singing loudly.

Several pairs of mallards, \\

yellowheads, blue, in marsh. \\

A pond, one or two male sculpins \\

at pond.

Many more trees lack. One of
May 7—Tuesday.

Headache for first time this A.M. about 6:00.

Found yellow-bellied cuckoo dead in garden by statute B.B. Feathers in front of chicken house showed that something probably caught him in the概括 together.

We needed him badly too, as the cabbages are on everything.

Wednesday, May 8, 1929.

Saw cackle this evening on the clothest line (5:00 P.M.) He pulled a chamber strap of some dress or something. He was a deep brown. Shang up 2 pieces of string to help with his meat.

The gate lay in the clothest over the chicken house. Also a snake crawl outside. The female flew before I quitted. After I went. It was black. Above to range. I heard, mark...
red sweet-berry below. He was
singing in the cherry tree tuft of
The summer tanagers I was
singing in the big wild cherry tree
the evening. I was perfumed red
alder, with darker red breast.
He is the same kind I
saw in the tree April 21. Dale
saw what seemed to be a myrtle
warbler in the garden, running on the
ground from in the brush tree. He
looked the same as the bird that
perched one day, May 5.
A yellow-billed cardinal was
eating caterpillars in the brush
tree. The birds were busy at the tree.
I feel better ordering these flowers.
A flock of myrtle warblers was
on the lot.

They were red brown on the back,
dark, gray underneath. Yellow
cap, dull red on throat. Eyes bright
dark.

Pair of little warblers at Snyder.
They flapped into the pines to
catch the look at them but
they seemed Maryland yellow-throat.
Pair of yellow Warblers at Olego.

Many black warblers were
in the trees around the pond. The
head, back, chest, throat, grey
breast were jet, shiny black.
Some lights the head was grey had
appeared a very deep dark blue.
A_Clear
crown, somewhat squared
white spot was on the wing. The under-
parts below the blue of breast were
snow white. "Then, she, "her-pressey,
sweet," a sweet song was constantly
imprinted by every little throb.
They hunted diligently thru the
custard, rather thick on the
brush. The clearing side of the

May 9, Thursday. About 2 dozen in procession way
to read. They were a little larger
than Eng. sparrows, but rather plump.
Black-throated Blue Warbler
fits him imperfectly.
These whirl at gay Black-throated Green Warblers at the pond.

There was another little warbler with olive-green back,
slanty head—gray-white underbody, white, white-ghost on lower back.

There was another warbler—the tall finches—orange-yellow
head & neck, olive-green wings—yellow back & stomach.

Several warblers—olive green back,
yellow undertail, black head & neck, underside yellow.

Some tiny warblers—olive green
or dusky wings of back, orangish-yellow
or rusted back, between wing & back.

May 11, Saturday.
Killed spotted-head warblers.

Several warblers—olive green back,
yellow undertail, black head & neck, under tail black.

Breadth of head at about 1 ft., long on real back.

Several warblers—olive green back,
yellow undertail, black head & neck, under tail black.

Some warblers—olive green
or dusky wings of back, orangish-yellow
or rusted back, between wing & back.
Saw what was a female Blackbuckian, or, more likely Redstart.

I saw also several male Redstarts.

Walked up to within 6 ft. of brown thing which was in brush, before I saw her. She didn't move as I turned away.

Saw one male & two female

Cambridge walking quickly around nearest part of corn Homestead fields.

May 17 - Saturday. Sunday.

Saw a number of Redstarts looking like collie, except for long plumage on tail. Two white patches tail feathers conspicuous in flight - white lower stomach. Tail constantly snapping & used for balancing when slighting quickly on limbs, in trees & on ground in insects. They were usually above stream in Point, by right side of road. Rather tame. Blue-gray Indicators.

Beside the road to "El Williams' place" I glimpsed a pleasant guy who had...
been scratching on sunny hillside.

In reading over the descriptions of various whirlwigs, I recognize the "Blue-winged," "Cheestnut-skip," "Magnatic," & 2 others as among those I have seen this spring.

Have also seen welcome through my valley, and The Hermit Thrush. Among the other small thrushes I have seen, I have probably seen the Black, Black-backed, "the Wetly-thrasher," but I have been able to identify them definitely.

The tulip-trees are in bloom now, & in them I saw a large flock of Cherry-trees. They were, in the mulberry trees near (1/15/18) eating them before they got red.

May 25, 1929
Ruby-throated humming-birds have been here about 3 weeks. The fireflies arrived about 2 weeks ago.

I killed 2 snakes today. One water snake about 2 1/2 ft. long at pond, the one that got away from before, and a water snake about 6 ft. long on bubble branch.

Dozens of Goldfinches in march today. They were all singing at one time, I saw several redstarts, and several blackpoll warblers.

June, May 28, 1929

Saw dozens of little warblers or flycatchers this evening. They walked over bubble field & in the pines. They were dusky slate-gray yellow on the back, lighter grayish yellow on their underparts. Several white outer tail feathers showed in flight. The flew along darting in every
direction, snapping their bills. repeatedly as they snapped up insects. At the two thistle-leaves
insects like waspers darted after bugs. Female Oriole Warbler Sept. 5/13/30
But in the field were many waspers, bright yellow underneath, heavily streaked on the sides and
with bright black, with a black spot black of 1 below the eye. They sang constantly "will will will,
will will weee," - Prairie Warblers 9/13/30

****Sept. 15, 1933****

I saw two of our gayest most cheerful citizens shamelessly making love today at the pond.
Mr. Chick A. Dee was dancing around Mrs. "Chick," fluttering his wings so rapidly they could
scarcely be seen. He was whistling rapidly "dee dee dee dee." I saw three plump youngsters of theirs in a pine at the pond; some weeks ago, there may have been more than three but that was all. I could see in the thick pine. That is all I could see at one time.

Jan. 22, 1939 - Sunday
The second brood of young
wrens is about to leave the nest in
the year tree. This half-gallon
oil can has to its credit 2 x 3
broods last year and two so far
this year. The first or second
brood is ready to leave the tomato

Three young ones of the first or second brood is ready to leave the tomato
can hanging from a low limb
in the small plum tree by the
dark porch.

The second brood of young
robin's have left the nest in the
top of the locust tree.

A sparrow nest in the top
of the pear tree by Peggy's flower
garden.

I located another robin's
nest in a small dogwood tree on
the lot today, using the lorgnon.
I found a catbird's nest in
a little dogwood tree on the
banks of the Crab pond, the other
evening, & at the same time
located the summer tanager's
nest in a little cedar, about
8 ft. from the ground. The tree is
on the banks on this side, next to
Carl's house opposite the Catbird.

A woodthrush had a nest
in a little oak on the path to
Ed Williams. It has been vacant for
some weeks, & now it goes.

The wind blew it away, perhaps.
There is another nest somewhere
near that one, as I see the wood
thrush flying back and forth
there with food. There are perhaps
six or eight young thrushes flying
around in a bunch. Two birds
joined I guess.

The Baltimore Orioles have
only showed up once or twice
on racing days. The Orchard
oriole is seldom out of sight
for more than a few minutes
at a time. He is singing constantly
in the top of some of the trees
around the house. His favorite
tree is the apple tree in front
of the chicken house, with the
Cherry tree, wild cherry trees,
walnut tree, & hawthorn about equal

I have not been able to find
either of the Oriole nests.

I had lots of fun last week in
Alexandria, watching thementioned
of the Eagle, patrolling with their 20 live snakes. They had one mountain rattlesnake and one mounted copperhead, but no other poisonous snakes. They also had a horned toad, a pair of fence lizards, Japanese toads, etc. The pilot, black snake, struck the Jacob's mastic five times while he was teasing it. There were five little loops of blood showing around on his hand. I sort of 'X' marked the spot affair. The S.M. is connected with the Wash. zoo or museum, I don't remember which.

The nested sandbees are only a few of those I have found this year, and only a very few that present on the place.

Speaking of sandbees, I saw five young whitebeards raised in a shallow woodpecker hole in large old pine stump, serving as a fence post in the fence below the oak tree.

When I first saw them they

had only a few pin feathers, if things were not done bad. Later they were fully clothed and ready to leave the nest, and conditions were crowded. I shocked their heads and they huddled down as low as possible.

Two days later mamma and I looked for them, but they were gone. While I was setting them that day the parents sat nearby, it didn't seem to mind.

June 26, Thursday.

Last Sunday evening I went down on the lot and found 5 empty chip-saw smellers, from this spring, and another one with 2 young Chipmunks. There were 3 young Robins in the nest in the cedar.

There is a nest of Bee martins in the top of the apple tree in front of Carl's garage. They are about 3 feet from the ground. It is almost invisible, being hidden in a thick log-clump, to look...
with about 10 apples hanging right down over the nest.

There is another wren nest in the tomato can on the corner fence post of the garden.

I had one little mockingbird there this day in the yard. He had just left the nest in the second cedar from the black cherry tree.

The corner cash, over the old cellar, has a nest in almost exactly the same spot as the wren nest was last year. A little ways down in the woods is a nest in a bush on the side of a black oak. I found three robin's, a thrush nest high up in a fork against the side of a black oak. I found these robin's, catbirds, and other wood-thrushes were fussing about something back of the chicken house. So there these wood-thrushes were in the nest to identify them.

I killed two ground rats and 3 mice with 22 shot shells this morning there was at least a dozen of them in one nest under the floor back of the east house.

I just remember that on June 15, when I saw the lovely chipping sparrows, I also saw several hooded warblers, either immature or females, as they had only small heads. They sang daily and constantly. I also saw a number of blackpolls and some maylans yellow throats. One of these, a beautifully colored male, sat on a post in the garden yesterday and sang for a few minutes.

The young scarlet tanager has left its nest in the cedar. The Baltimore orioles have been here for several days, eating the plums on the vine.

The orchard oriole has not been seen for a few days.

I killed a rabbit, a snake, and a water snake about 2 ft. long on a tree limb about over the 3rd culvert from House baking place.

July 2, 2nd day - Went down to
road will stalsa today. Killed 2 ft. water snake at culvert at bottom of Hurbaken’s hill.
Killed 5 ft. 6 in. black snake mid Cub’s place by barn.

July 3rd 4th

Put big drainage back together in pond. Carp caught him Friday in stream below Wellman on old road. We were coming back from Jeabsco dumpsite all glue at Cub’s store. “Diy” was about 15 in. long & about 10 weeks.

Forgot to mention this snake in proper place. Should have been 16th. I was going to meet bridge at 30 clock when I heard the birds singing in Cub’s woods back of the culvert. There were about 2 dozen robins, six or eight catbirds, about 4 cardinals, some wrens, & the pair of Indigo hunting the first time I have seen them this year. One pair of robins

especially would light on a little open clump of brain, and lay in it backed & quickly I went thru the fence & heard I saw a big black snake, fully 5 ft. long. He still had about 6 in. of his tail hung over a limb 2 or 3 ft. from the ground. The lower part of his body was coiled up tightly, and he held his head buried and the wing of a baby robin he had just gotten out of the bushes. I could find only a stripe about 3 ft. long.

2 in. thick, very heavy. I jabbed in thru the bushes, striking his head several times, he throttled about for a time, & suddenly darted but for the thick bushes. I drove his head about 3 ft. in the mud & took the young robin from under the bird, keeping this on a limb. The parents backed on the ground for him, fussed around the snake,
undecided whether he was dead or not, I was still uneasy when I left 15 min. later. I felt so sorry for them, calling & screaming constantly.

I have been watching the bluejays near the house. They appeared ready to build in my tree, some days ago, in the path near where they nested last year.

Last week I saw several pairs of bluejays building a nest of sticks & cat tails. Here with them I haven't seen or heard anything of the orchard oriole for awhile or more now. Blashan says the song ends early in July.

The female bluejays' nest has been here at all times of the day, eating, eating the plums.

I think a beaver has his nest in the big willow oak at the bottom of the hill.

19th. snake
July 8, 1929, Monday
I killed a 3 ft. water snake at 400 today. He had many small eels around his body, resembling a corn snake. He stuck weakly down stream with part of his "inside" out. I wanted to kill him outright but he disappeared a few yards from where I shot him.

Saw a black & white creeper on a tree in the middle woods, back of the old cell this evening. I was going to wait until I hadn't time to watch him. He seemed to be alone, but happy. I followed him around a black oak, where he flew to a white oak, then flew up among the limbs where I couldn't get him.

I found a dead muskrat at 400 today. slider & "snapper" were trying to eat him. Just his nose in the water,

Saw 3 new squirrel nests.
Wednesday, July 11, 1929

Went to Wash. This morning, Annette went to buy a program and asked me to meet her at the rear of the theatre at 9:45. While waiting there I killed a ribbon snake about 1½ ft. long, which I believe was in a stream, and a young Copperhead in the stream a little further up. A large water snake got back below the little falls. I missed his head after he poked it out. I tore the place up but couldn't find him. Have seen him several times since.

Saturday, July 13, 1929.

Killed 3 ft. Copperhead on 22nd. Able to fetch over stream in Castor snake. Woofle. One bullet thru head just inside right eye.

Saw prairie sparrows on path just over hill this evening. It looked as if we got within a few feet of him several times & I got a good look at him. His head, neck, throat & stomach were clear yellow; the gular & stomach heavily streaked with black. I got a good look at the chestnut spots between his shoulders. His wings back, & tail were olive green. He sang as he hunted.

Sunday, July 14, 1929

Went after snakes at road about 11:30 A.M. Saw Great Crested Flycatcher on dead tree behind old Cellar, helping to feed his mate who was there also. Saw some Blue-Frog Flycatchers high up in pines by stream marked. Went over to meadow in middle of fields. Saw what I must have been a Yellow-
him glistening and snapped up to within 2 feet of him, the sat there was a magnolia tree, watching me and fussing. His head, neck, back, wings, and tail were brownish or dark olive green. His throat and breast down to the legs were bright clear yellow, darkest on the throat. From his heavy legs back his body was white. His bill was black and somewhat heavy, and seemed to resemble a shrill to very much, even to the hook. His legs were dark gray.

His body didn't move the whole time, except his head and throat as he tilted them somewhat to scold. His throat would swell and the hazy chirping chirping intonations, had a twang as though coming from a stringed instrument, dog hango. I see he gave a pretty little song. I watched him a long time, moving around into the bushes in back of him, while he sat there, fussing. A little Maryland yellowthroat (female) had gone around in the bushes below him.

Later he was flying along in the bushes near me and scolding, and his wings of tail (which was pumped up/down as he flew) made a loud, heavy, slapping sound. This may have been another bird instead of the same one, the mate possibly.

I forgot to mention a broad white line over his eye from bill to throat, & a tiny white eye ring.

While following a narrow path through high blue wild wall of vine, alder, magnolia, sassafras & willows, a little bird fluttered in friskily about 3 ft. from my head. It looked like a baby black & white, creeping winner, but it
hunted in the bushes a few feet from me, like an old bird hanging upside down, flitting, hopping along hills, etc.

His feathers were raggy and pale like a young bird not yet fully clothed only the outer tail feathers were present. After awhile he passed out of sight in the dense brush a few feet away.

I climbed the huge maple tree and stayed a long time. A mourning dove, bit about 10 ft. away in the other part of this double tree, and after awhile, crossed a bit, her voice sounding as low as it would stand at great distance. After about 15 min. she flew.

I saw a number of Carolina wrens in the marsh here, as on the path to the road. They just appear in the last week. They are here every year in these two places, as well as at the pond.

There is a big hollow back of the hill behind our house. Three this hollow a steam runs and then there falls over a place to which I was in this morning. On the stream I saw a bird which must have been a female cheswink, but didn't exactly resemble any I ever saw. The long was scratching like a cheswink in the leaves back in a dark nook under briers & bushes. Its back was brown with a reddish chestnut wash on back of the neck & neck. There was a number of white stripes running lengthwise of the wings, and white outer tail feathers making the birdaovvver back slm streaked with white.

A little farther up nearer the house I saw a little Maryland yellow-throat singing. They have
near here I think, where the road cuts thru the hollow.

The kid that seemed a cheetah had its breast, where speckled with light grayish-red. Stripes, like the upper part of exclamation points. They all run straight up down. The breast was pale grayish-buff.

Wed., July 24, 1929

Played half Monday for the first time in 6 on Tuesday morning.

June 14). Played Sunday. Wed. we went over to Rivers run with Oscar, batting yarn to the school ground for J. P. Davis. St. Park 4-5.

Buddy and I went out on bridge with bean shooters. Saw ruffed waterfowl at foot of the first

pasture just to the right on this side. After a few shots he slided under a log. Then a foot long snake swam out. We shot at him

for 5 min. I came within 16 in. of him once. Buddy came within about 3. He was straight under us and the shooting was done in a very cramped fashion. Finally I got in a little better position, and the second fish cock wheel'd him on the head. He turned over on his back, and laid motionless for awhile, finally floating out with the tide, stone dead. Saw a dozen large sturgeon.

Fri., July 26, 1929.

Played half today. The Goodricher and Cardo were here, also Bob McAllum. Dunsire wrote that they couldn't play Monday. Sat., but would

Monday.

Buddy and I went out on bridge saw one large 1 one small snake. We worked both several times.

Saw an Indigo hunting (black)

Kissing on the tip with the bridge Wednesday & today.
Bubbles started tracking today.

Sunday, July 29, 1929

Seek white crane at pond.
He certainly was beautiful.

24th

Killed black snake on
snake stream from castle woods.
He was nearly black, about
5 ft. long. That I saw 2,
But the one that went under
the bank, may have sliding
to the top, under the bushes,
where I killed it.

Tuesday, July 30, 1929

Went down the stream bed
of Mr. Alling's paint shop, with
"Bobby." Took dozens of bugs
of all kinds along the shore.
And the way track I killed
a 2 ft. water moccasin
.-
Good luck of the work shop.
This was a garter snake,
Having light rings
around its body, not like
an ordinary water snake.

Went to Woodside this
morning to get egg crate.
Pitched horseshoes
Harry, Endicott and I.
Bobby, Sherry,
& Harold pitching by himself.
Harry
& I won 3 out of 5 games.

"Bobby" & "Bud" McPherson came down. "Bud" MacCallum,
"Bobby," Sanford and I, stood
Bobby, Harold and Bud
George Mac Mahon. Clyde
Bedell played first base
for both sides. "Bobby"
Holly & I won, 4 to 2.
George had his patient
indulgence as wide ball hitter.
But one goer over the woodshed
I so did George.
Mary starts her vacation
this evening.

August 3, 1929

Lazy lately. Haven't been
keeping my rats. A female
Orchard Qotch has been
taking the last of the red grapes from the cedar tree 2 hours from the vines outside the window. I got within 3 pt. of her this eve. I haven't seen the male since late in July, when I saw one on

the Wood Bridge school ground & befriended at Kate Chambers' this side of Woodville. I wonder where

he is and the children, if any.

The female Salt oside appeared some time ago during a rain as last year, but lately she has been around a lot, in the middle of this long dry spell, which started early in July, broken only twice by a little rain. No male or children here either, as yet.

Have been the flocks of woods white wings many times lately; the downy wood

peckers, Nutshakers, chickadees, black & whitecregs, vireos, etc. I have not yet

sighted a browncreg away, but there are very inconspicuous anyway, &

haven't watched closely.

On my way home from Woodbridge this evening I saw about a dozen little pine warblers. They were

smoky, dusky by flight on the back, and lighter underneath. The wings & tail were all green, with

the white outer tail feathers very conspicuous, especially when flying from limb to limb or flitting after insects, like

a flicker, when the tail was spread. They were in the large

dunes & small shrubs along the paths near the big well-water

turns the way to the school.

I saw a large drift of

woodpecker in the dead
Saw another hairy in a dead tree near Seib's back of the house. Both of these were seen in July.

Special Note: During the summer, 2 or 3 yrs. ago, Riggy and I went into Seib's
in the middle of the road between the small house; just after
we came out of the woods near the cliff we found
a large skunk with its dead.
We saw a bear was firmly
clamped over its neck,
separated its back of the
head, of a large black
snake. The snake was about
5 ft. long. The grey
skunk was somewhat disabled.
getting larger all the time,
its shape along the level
stretch of red clay beside the
road. In one place he
had spun like a top, gone
on, and when we reached
was spinning again. I knocked
the ball off, stripped his
plate clean, led him off
in the grass.

The circles were almost perfectly
round.

The ground was muddy as
the one went along dragging
heel in the mud.

Henry Washington won their
third straight game from Bucky
Barnes’ Detroit Tigers, today.

Myles Thomas & Fred Mackey
beating them 9 to 6. Mack
made 4 triples. Hayes

Judge, West & Rice. Double
play. On a hot line drive to
Sam Rice in St. Field, Johnson
(Roy) was caught at the plate by
a wonderful pg.

E. C. Bracken won the first 6-

Pinch T. Hayes getting runners.

had "Sam" Jones, recovery
from a long series of illnesses.

that Detroit in the second
game, 1-0, three double
plays, killing off Detroit
rallies. A hit from with
Moyer on first, unable to
at Bat, scored Moyer on a
long single. Wash is in
sixth place now, but only
1 game back of Detroit.

of the last game of the series
up for tomorrow. Beibly has
won 15k from Warrendale
so far, she having netted
5k on Bucky in each game.

Killed 1 squared the Week.

Mary was home. One bullet
Aug. 22—The female orchard oriole is outside the window now, after grapes. I'm afraid they all gone.

Woo hoo! I'm all jiggled.

I wasn't sure whether this was a female scarlet tanager or orchard oriole. I haven't seen a tanager female closely for a long time, I've never have gotten a good look at a female orch oriole, believing it to be such. I think think there is an orch oriole but Blanchan says an oriole has a blacker throat. This one great but resembles closely the female orchard oriole printed in Robertsgill's book of Bird Paintings. This bird says: 'Chirp', 'Chirp', 'Constantly! She was up in the lilac tree by the chicken house today, just now going every hungry trip carefully, chirping all the while.
Sun., Aug. 25th, 1929.
Went down in Mr. Wabans woods this A.M. after hawks. Killed 1 little splat-head mussel 26th (bog-nosed snake) about 8 in. long and with a stick.

Sun., Sept. 1, 1929.
Came down here today with gun, walking close to fence, looking for trout to rescue out of past hole. Almost stepped on large copper head. Her head & tail were in a hole with a big 6 ft. stump serving a snake a fence post. I shot her once or twice with the bean-shooter to break up her back & pulled her out. She faced around & stuck out her tongue. I killed her with the bean-shooter & jabbed in the hole under the stump with a 2 ft. stick. Out of this hole Arrow in monkey the huge ground elide the snake. I knew he couldn't get away so I shot him a few times with the bean-shooter. His back was hurt, but he whirled around & slid back into a mole hole. I dug up all the ground around the stump with the little stick. I then called David to get Papa up bring the chick. I came instead & got this automatic .41 rifle, neither 18th of which I needed. I went for his mattack. I showed him where to dig. He cut past way thru the snake, pulled him out, shot him with the rifle. However I could have killed him with my bean-shooter a gun, so he's mine.

went out early this AM & tame squirrel. met Johnny hunting. He had one also.

Shot two hawks, twice &d. the first one, in the woods, at about 15-40 yds. or less, the second, a large marsh hawk, in the open field, at about 209-35 yds.

Didn't get either one, although all four shots were perfect hits, both hawks were head hit. These Remington Clubs breakable when I got them. They haven't much killing power. The 1st hawk sailed back into the woods real slow & the 2nd dropped in Bob's Corn, I think.

Feb., Sept. 3, 1929.

Saw many little woods lizards near the old gun tree this AM. Saw one vivid which, from the bottom, looked like a female skirt.

tanager. Her head seemed very plump, thus, from the middle of her stomach, down between her legs, & on back, ran what resembled a half-inch wide streak of blood. It was some sort of red marking. Saw also what appeared to be veery in the trees, quite a number of them.

In a hickory I saw a small thrush, a very little (fairy), larger than an English sparrow. His upper breast was thickly spotted with small round dots (like B. Ee.). He was very tame, & flew about picking insects, also sitting still for short space of time, looking about. Owen said (R-209).

Monday, Sept. 9, 1929

Got the killed one king snake in back yard today. Didn't want him to go in on the sheep. I shot him that the body ache.
went under the stage, began to pull them out & jumped in two.

The dogs were playing with me outside just now (about 8 o'clock) We wouldn't let them come in the gate, and a few minutes later I heard a shot down at public square. I went out & was startled by the gat which shot me. For a while the gate shot I think Beulah was mad after playing the guitar.

Fri. Sept. 13, 1929

Puppy was here this morning. I didn't expect to see him again.

We went hunting in Burn's wood this A.M. Met 3 flocks of tree-squirrels. At the pond I saw a hairy woodpecker, a black & white creeper, & a black-backed wren.
went under the steps. Papa tried to pull him out, but pulled in two.

Thu., Sept. 12, 1929. The dogs were playing with me outside about 8 o'clock. We wouldn't listen come in the gate, and a few minutes later I heard a shot down at public hunt. I went out. I was shot, but the quail didn't show up. Now he and the gun were mad against me. Ouch!

Fri., Sept. 13, 1929. Pappy was here this morning. I didn't expect to see him again.

I went hunting in Burd's woods this A.M. The 3 flocks of tree-squirrels, at the pond I say black and white-creeping waddle, and redstarts (The first I've seen in some time) many pine warblers, several downy woodpeckers, chickadees, and purple martins, all of which I couldn't see, because of the poor light. At the top of the Big Oakland which many of them were working, well two larks resembling skylarks from below, & of almost the same color. They darted back & forth as they alternately other flying together. Because of the dull, gray, cloudy sky the birds were hard to identify. I named the redstarts first by their spread tail & wings, before I said their colors. "Hairy" certainly can drive. This flock must have numbered several dozen birds. Saw a young, or female, Maryland Yellow-throat.
1. Russell-Crowned ground wren-like - Own form, white-tipped tail, golden under.
2. White-tipped ground wren - Own form, white-tipped tail, golden under.
4. White-eyed vireo +
5. Scale or summer tanager - Portland area - Red, as in yellow warbler.
6. Yellow Warbler (c) - seen on pine tree line.
7. May be Least Flycatcher (?) - Acadia

Nashville Warbler? Yellow-Rumped Warbler?

4/23/29 - Shown in the museum.
Saw the first scarlet tanagers in Chequamegon
morning.

4/27/39 - Saw beautiful little clear gold bird this AM.

4/27/39 - Saw beautiful little clear gold bird this AM.

In the wood the AM, I saw a yellow warbler, also a number of short stripes down the breast.

In the wood the AM, I saw a yellow warbler, also a number of short stripes down the breast.

Munson's - He had a golden rump & sides, white breast, white throat, dark black (black with white tip) streaks. There were two distinct white bars on each wing (Golden-throated).
The text on the page is difficult to read due to the handwriting style and the presence of drawings and annotations. It appears to be a page with notes, possibly related to scientific or mathematical content, but the specific details are not clear. The page contains a mix of numbers and text that may be part of a formula or equation, but without clearer handwriting, it is challenging to extract meaningful information.
May 8, 1924

Hoody warbler
Black back, head, throat, upper
heart. Conspicuous white spot
in wing. White underparts, other wise
Black-throated green warbler. Other

ings-

warbler-with orange-yellow head
and orange wings—yellow back—stone

warbler—Olive green back, yellow under
body, Black hood over head & neck. Eye
white, bill yellow, forehead blue yellow.

Circle on cheek about tips.

Parula W. I.

Redstart—black & white spotted on top
Head black, white line under eye. White
darken back, white tip of bill.

Black-throated green warbler.
3/12/29

Warbler - slaty blue (head) back, neck, yellow-orange, shoulders (between wings) yellow-orange, yellow-shaded wide, side gray, slate. Narrow on throat, bordered on all sides by slate. Throat and below yellow throat, fainter than yellow slate line below yellow throat. Throat with red-brown crest. Underneath white.

Redstart?

Blackpoll?


White rump - one white like a catfish.

Long slim bill - two white feathers tail composing works in flight. While lower stomach.

In flight, constantly snapping (used for balance).

Pleasant.

Blue-winged warbler.

One chested warbler.

Migraria.

Fine warbler.

Dwirbler — field head neck black
lower back of gr. & black—wings &
with white bars. Black throat black.
Mynthle wankerle.

Flycatcher — eye gray & yellow under eye
of gr. back — "quiet, quiet.
Great crested
wankerle — of q. b. back, orange yellow throat
wankerle — of q. b. back, orange yellow throat &
upper breast — black to meet the soft
dark head — white underparts (Kentucky wankerle
Canadian?).

I wankerle like the mynthle — but if "Goose" wings.
Had black stripes instead of solid black line &
sides. Yellow spot on cheek, white throat clearly
defined by black stripe at bottom. Light stripe.
Yellow? on brow. Skin: yellow wings.

Sandpiper?

Quin. Thrush.

M. Thrush.

Many word thrushes.

5/1/29

Quile argied this AM.

Yellow-t. Cuckoo arrived last night ago.
5/7/29
Yellow - b. Cuckoo dead in garden
found.

5/8/29
Saw mole this evening on clothes line.

Pulled shoulder straps of clothes from net.

Hung up 5 pieces of string. Net tied around

So many wasps there also.

Sugar vangue in wild cherry tree, singing.

Summer turned in wild cherry tree, singing.

Hipter wasp labi 2 in garden on ground.

Yellow Cuckoo eating apple leaves in locust tree.

7 lots of my little wasps on lot.

5/9/29
2 dog. thoroughbreds.

Red-brown one fake. Pale. Larger than


Underneath darker. Buff wash on throat. Pair

of little warblers (Maryland yellow throats)

At Snyder's.

Pair of yellow Warblers at Perry's.
4/29/29 - Monday,
1. Bluet - blue warbler with pink head
2. Black and white
3. Catbird
4. Two redbirds

Wood thrush

5/1/29
Indigo-backed warbler, white ear. Back black, white tail. Eye black with a white streak.
Upper haunches heavily streaked with black. Streaks of white lower wings not sharply pointed. Segments to have any break. Tail pointed and base tangerine-red, walked along limb pretty.

Warbler - olign., back, wings, tail. Bright, warbler - olign. back, wings, tail. Bright

Warbler - back, Warbler - back, iridescent yellow, iridescent yellow, iridescent yellow.

Maryland yellowthroat in brushpile.
CaC₂

CaO + 3 CaC₂ → Ca₃C₄ + CO

CaC₂ + 2 H₂O → C₂H₂ + Ca(OH)₂

Acetylene

Starting point in making NH₃ and fertilizers, 
HNO₃, explosives, etc.

Silicon Carbide

Si₃C₄

Coke, sand, salt & sand dust

3 C + SiO₂ → Si₃C₄ + 2 CO

Cyano-geng

H₉(C₂N₃) → H₉ + C₂N₂

HCN

Hydrocarbons

Methane series: Ethylene → Acetylene

C₄H₁₀ → C₂H₄ → C₂H₂

Benzene

C₆H₆
Kildee – Feb. 12, 1930
4 weeks earlier

Fel. 13 – 1930
Woodthrush

Kildee – Feb. 20, 1930

Hermit Thrush – Feb. 21, 1930

Fox Sparrow – Feb. 25, 1930

Long-billed Marsh Wren –
April 5, 1930

Wilson’s Thrush – April
19–1930?

Late Date – Myrtle
Warbler – Apr. 27, 1930.

A. Wetmore – May 30, 1912.

Late Date – Myrtle Warblers
May 5, 1938.
Number

Rate

Cong. Dist.

Naval Service

Minority

Grade
chirping - simmer, but slower with chipping intervals between notes - much slower: - all of them here sing a very rapid-slap
And tell very pretty - also their beautiful, liquidless common fadee fadee reeeem "song. Also the laughing "wicky, wicky" song, which I heard young ones say

8/10/30 - 9:35.
Ready-Made Hand-Tinted Circular Apron.

Made Circular.

X67E69—Package of four-strand wash-fast Rayon Floss to embroider any one of the above numbers.—we pay postage. 38¢

X67E33—Stamped Pillow Top. Plain back. in. square. (Requires 1¾ yds. edging).—and w

X67E34—Scarf to match. Size about 16

(Requires 4 yds. edging.)

X67E35—Centerpiece or table
and men's shirts. About 36 inches wide.

51E1355—All-Silk Washable Radium. About 36 inches wide. For dresses, slips, etc.

Each of the above materials comes in the following COLORS: pass, flower, Castillian red, English violet, Pandora green, sunburn tan, Byrd blue, Spanish wine, spun gold, cactus rose, Jeanne d'Arc blue, Hawaiian brown, jade green, gobi poppy, tan, Imperial blue, French beige, rose petal, marron glace, Zeppelin grey, claret wine, Coppen blue or navy blue (all illustrated on opposite page); also flesh pink, pilot blue, orchadee, sun star, honeydew, middy blue (light navy), silverwing grey, briar rose, cameo nile, maize, sherry brown, pink, cocoa, coppersheen (reddish bronze), English green, chalet red (bright rust), Monticello green, white or black.

Order by style number for material and state color desired.

OUR PRICE, Each: A yard, 94¢ —and we pay postage.
"Just Folks"

By Edgar A. Guest

The Prizes.

Said an old-time champion to me, as he showed me many a prize, which he had won in his earlier days:

"Are they dazzling to your eyes? You think them precious to hold and keep, but the fire I would throw them in could I only be the boy once more with his first prize yet to win.

"These are trophies of victory, and time was I thought them sweet. But I'd rather be out there playing now and facing again defeat than sitting here in an idler's chair with my prizes round me lined, with nothing to dread, and nothing to risk, and nothing to stir my mind.

"Oh, the game is more than its prize, my boy, as soon you will come to know, the joy of the race is in running it, and not in the thing to show. I've cups and medals enough to spare, but I'd give them all to claim the thrill of the youngsters struggling there who haven's yet won a game.

"Now I'm settled down and watch them go to the fields to lose or win, with eyes aglow and with hearts on fire they'll battle through thick and thin, and I'd rather be those who will lose today, and tomorrow will try anew, for they still have the joy of the game, while I am left with a prize or two."
An additional $10,000

former profits were entirely eliminated.

be 6.60 per cent.

A net profit of $13,076.60

A surplus earned through

of the Company's

entirely eliminated.

of 10.00 per cent.

from the redemption or

The surplus earned on the values entered in the market

additional to $42,863.57

substantial appropo-

of further stock.

of the Company.

were entirely eliminated.

on the market

During.

lies as a provision aga-

were entirely eliminated.

were entirely eliminated.

many of the Company's

bonuses and stock pr

many of the Company's

were entirely eliminated.
"We know ourselves so little that many think they are about to die when they are really in good health, and many think they are well when, in fact, they are on the brink of death."

That is not quite so true today as it was when Pascal penned it three centuries ago.

Popular education and readable books on physiology have helped. The popular rules of health are based less on superstition and more on science than was the case a hundred years ago.

Still, the body we live with from infancy to old age is largely a stranger to us. Just for a test, try yourself on these 20 facts about your body. How many do you know?

They are noted from the first 200 pages of Dorsey's popular book, "Why Behave Like Humans?"

1. One-fourth of all our muscles are in our neck and face.
2. If one-third of our skin is destroyed by fire, acid or other accident, we die.
3. We have 32 teeth; eight on each side of each jaw; that is, two incisors, one canine, two bicuspids, and three molars.
4. A man 150 pounds in weight would weigh 50 pounds if he were thoroughly dried out. Our blood is 90 per cent water. Our bones are nearly half water. Conscious brains are 85 per cent water.
5. To balance our head on our spine, we use 20 muscles. To balance our spine when walking we use 144.
6. In walking, each leg rests half the time. We tire standing because neither leg gets rested.
7. With every step we take about 300 muscles are used.
8. Our body temperature is regulated and remains constant at 99 degrees.

---

The Spectator

Registered at Post Office

---

MORE TRUTH THAN POETRY

LADY ISABEL AND THE THIRD PARTY,

By S. E. Kiser

"The lady Isabel possessed a proud patrician air. Although the clothes in which she dressed were hardly more than tare."

"Within her gray ancestral halls the scene was seldom gay. The beams that rested on the walls were weakened by decay."

"The old earl wasn't feeling well. The words he spoke were sad.

But proudly Lady Isabel addressed her titled dad.

"He is not downcast, old dear," said she, "the outlook's not so worse. Good luck's in store for you and me. Despite your empty purse."

And said, as happily she smiled: "I'm feeling better now."

"But Prince Gazooks came in Gal's heart is like to burst. A movie queen from Hollywood to the square inch in the palms of our hands and the soles of our feet."

"To save our proud estate, a fortune teller told me so."

TOMORROW Prince Gazooks arrives

To ask you for my hand;

I'll be the second of his wives."

The first one he has canned.

"And he will find a way, I know, To save our proud estate;"

A fortune teller told me so.

Out yonder gate the up and his Up on a hill

Occasionally opportunity will make a man, but he can't always hold the job.
Packard
Asks You to Inspect Its
Renewed Cars
We Want You to Know
What a Good Car a
Renewed Packard
Can Be
You Specify Your Own
Colors,
Your Favorite Tire,
Just How You Want
Your Motor Done,
Then We Prepare the
Car to Your Order
Each Owner Takes a
Particular Pride in
Such a Car
Let Us Show You How
We Do It
Packard Washington
1707 Kalorama Rd.

$25 CASH
When Used as a Deposit Will Hold Your Car.

Figure What
You Can Buy With What
We Save You on a
Good Used Car

1927 Peerless 6-80 De Luxe Sedan .......................... $1175
1926 Chrysler 70 Roadster ..................................... $1475
1925 Buick Standard Coach .................................... $1250
1925 Studebaker Big 6 Sport Road .................................. $1350
1925 Buick Standard Coupe ...................................... $1200
1925 Hupp 8 Sport Touring ....................................... $1400
1925 Chrysler Touring .............................................. $1400
1925 Nash Special Coach ......................................... $1600
1925 Franklin Ser. 11 Sedan ..................................... $1500
1925 Marmon Sport Sedan ....................................... $1600

ALL GUARANTEED
TRADE-INS
1924 Chevrolet Touring ............................................ $75.00
1924 Willys-Knight Touring ....................................... $150.00
1924 Durant Touring ............................................... $50.00
1924 Hupp Touring .................................................. $100.00

Southern Motor Sales
1924 14th POT. 5551

Lambert-Hudson Motors Co.
1722 L St., West of Conn. Ave.

CHRYSLER
Used Car Department
1925 Chevrolet Coupe .......................................... $1450
1926 Chrysler 70 Phaeton ......................................... $850
1924 Maxwell Touring ............................................. $225
1925 Dodge Touring ................................................ $675
1925 Ford Coupe .................................................... $225
1925 Maxwell Club Sedan ......................................... $450
1925 Hudson Touring ............................................... $500

H. B. Leary, Jr. & Bros.
1612 You St. N. W.
Phone North 4296

FORD ROADSTER 1926—A wonderful buy for $525.00.
DONOHOE MOTOR CO.
215 Po. Ave. S. E.
Phone 250.
Sat. Sept. 28, 1929.

Coming back from Oregon this A.M., I killed a little furtail snake long copperhead snake in the weeds back of the cellar. The chicken was after him. I striking he left the ground a foot.
Wednesday in Bubbles to see Bob to get cake for my birthday. Killed 1 cappie hawk with 22 rifle, stiffling him & cornering him on the branch opposite the Little Bridge. While following him then I saw I killed a large rabbit in his bed.


Lost a shirt, necktie, 3 pairs covers, 1 pair pajamas, 1 pair garters, 1 bird guide by Reed & 1 Wild Fowl guide by Reed.

Mon. Oct. 7, 8, 9, 10, 1929.

Saw first southbound white-crowned sparrows on path first just big tab. That one was seen bird at first. Must have been young, since there was no black on head.

Fri., Oct. 11, 1929.

Saw a number of white-throated sparrows near road this evening about 4:30. So leaves, but flying. Tried to trace them into whistling, but the one I tried would only chirp. Its voice was almost lemon-yellow.

I heard one of these sparrows sing this A.M. at Cannery about 7:00.
Saw a yellow-throated vireo several days ago. I have seen brainy woodpeckers several times lately.

Saw a very busy bird in the old willow tree in front of Bob Weyland's stone barn. It seemed to be a female blackpoll warbler or perhaps one of the vireos.

Sun. Oct. 6 or 13, 1930.

Killed foot-long young copper—31/2 feed in side of old pine stump beside meadow on Castle woods to pond.

Killed gray squirrel in woods back of house. Killed 1 rabbit just over hill at dark, I could have killed 2 more.

Sun. Nov. 3, 1930

Have seen several dozen kinglets lately, the first one about two or 3 weeks ago, on the hill above Shubie branch. Most of them were golden-crowned.

Saw several red-breasted white-throats of the pond about 3 weeks ago. I believe I have seen them here other times but am not sure.

Have seen the usual flocks of red-tailed wrens, titmice, chickadees, black- and white creepers, etc. lately.

Have not seen that hermit (?) Thrush for about 2 weeks. He stayed for over a month in the hickory tree down in the pines near the road.

Saw what I believe was a Berry or Wilson Thrush about 1 week ago.

Many Field Sparrows around lately. Flocks of Robins have been around lately, mostly coming from the south; mostly also in flocks.

Fri. Jan. 24 - 1930

Two (2) inches or more of snow has been here about 2 weeks. It all ice underneath. Saw a large
 Sat. Jan. 25, 1930

No saw one large robin at Morgan's gate. He was very friendly and kept chirping, acting as tho the handsome. He may have at that. He was eating some kind of berries off a tree I forget what kind.

I saw a cute little golden-crowned kinglet in the cedar by Rose's garden 6 yr. some weeks ago. Tho come around once in a while.

Mon. 27, 1930

Snow about 1 to 2 ft. deep.
Mid-winter tests started 23 last Thursday.

Thu. 6 Jan. 1930

Wind a light E. at noon.

Whistling in the big tree on Y. M. Campus this morning. He was whistling just like the one I heard up here last year. He sounded like a red bird.

Thur. 7 Jan. 1930

The large robin today in pines.

Sat. 8 Jan. 1930

Many tufted tit mice and chickadees also my thistles around today. In hundreds

Crashes on the oak tree there were acorns which they have opened after sticking them tightly. They were singing red

toot and came to the ground after the acorns. They are

Flying back & forth anywhere.

If it were not for the cold

North wind it would be nice

here today.
Wed. 12, Feb. 1930.

Heard Killdeer Calling this evening as he flew over. I heard one seven weeks ago, also. Sounds like spring.

Thurs. 13, Feb. 1930.

Rmean wood thrush singing in back of the tobacco. Census a 7:00 A.M. 5c raining and the redbirds were wheating.

Sat. 15, Feb. 1930.

Started to snow this afternoon around 2. Snowing past as the darkens. Stopped about 8 or 9. About 1 in. Snow in many places. Very light. We groomed from the summit. Most of snow.

Sun. 16, 1930 - Feb.

Mary came home yesterday eve! It's quite cold today and the wind blew this am. Mary left at 6:45 to catch 7:15 train. Found later it didn't leave until 7:38. Moved back to its old time.

Wed. 19, Feb. 1930.

Bluebirds singing this A.M., as were white-throated sparrows, fieldlarks, titmice, redbirds chirping. One of most beautiful spring days I've ever seen. Not a summer day. Walked work on new school building.

Thurs. 20, Feb. 1930.

Temp. 76° ln Wash. Broke 56 yr. all record. Same birds as yesterday. Bluebirds singing.
Sat. 22, Feb. 1930.

happily. Killdeer flying overhead, same as same weekend before snow. Rain coming toute for Fri. 21, Feb. 1930.

Boats caught a small thrush this A.M. A hermit guess, I'll have to look it up. Little devil! Bleuets were built in paper boxes on woman's farm this morning. Carl saw wild geese go north several days ago. Two pairs of red birds (Cardinals) were chasing each other around in the loft this eve about 6:00 or later. They didn't seem to have definitely paired as they did not keep in separate pairs in their love making. The last three days have been some of the best I have ever experienced. Frogs have been singing since Thurs, or wed. eve.

Robins singing Blackbirds, really singing this time, down in Thompson's Snowbirds singing their spring love song today. One was in the garden, singing a little sitting upon a tree, then flew quickly into the grass.

sparrows & bluebirds singing and mating. Redbirds mating, also chickadees, titmice & nutbles. Crooks everywhere.

Sunday 23, Feb. 1930.

Robins & other birds everywhere. 500 or 1000 robins eating in yard in Babbs field. Little frog jumped in water opposite red mud in field. When I came back, frog was going out to goonage for Carl.
Dreampin Kittrell County, Minn.

Monday, 30, 1930. Ned. Spring again after slight clouds last yesterday, with

scramble everywhere.

Thousands of frogs. Papa

heard a hawk screaming
today, not wheezing. Killdeer

singing. Read bird magazine
in Congressional Library today.

Especially the "Ark." Read an
article on Connecticut air

warbler. I told of finding nest,

eggs & nest for Minnesota.

Thundering, and lightning
flashes about 9. Oh, knew 10:30 P.M. It has been rain

about 1 hour. A young show.

Heard a wood thrush

singing again this morning.

Heard above cooing this

evening somewhere near

Beard's. The first one I've

heard this year, and a

good sign of spring.

Saw 3 large ducks flying

north about 7:00 A.M., over Bald

gate. Looked creamy yellow underneath.

Tuesday, 31, 1930. Fed.

Heard a hawk screaming near

pond about 6:55 A.M. as I went to

hill. Birds singing everywhere.

Killdeer & Bluebirds. A robin

was singing his spring song, Ipsos.

Frogs are singing constantly.

Inc. W.E.K. I saw a large

number of birds in yard

near culvert at 9:00 a.m.

Among the cardinals were many

birds I take to be fox sparrows

although they seemed much larger. They

seemed almost a red, so bright

was their breast. Their breasts

were heavily blotched. Nothing

in a hurry I watched them. I

finally became aware of a rabbit

"frozen" in a little open space. I

tossed a rock at him which hit

a small alligator above him,

dropping a thin cloud of yellow
pudle beat which floated away. I tossed another, and he still didn't move a muscle. I then went off and left him.

The birds were bleeding cheepers in their bellies, but, although I couldn't see them very long, I do sincerely wish we had kept them.

I wonder if those flocking birds I've been thinking about have been Horned Larks or Prairie Horned Larks? I saw them many times over the corn fields, always flying a good ways up, so that they could only be seen as having grayish white patches on their breasts, the large flock always gave forth a loud twite, somewhat over-lilted and musical.

Thurs. March 6, 1930

Have been home since Monday. New shoes wore a blister on the left big toe Monday a week ago, hit kept getting worse. Sat. The doctor saw it and had me put something like antiseptic ointment on it. It dried out about a tea-spoon full of ugly pus. But my toe is far from well.

While sitting in the front yard today, a curlew along sparrow hit on a nest in the garden fence by the forsythia, and sat there a minute showing his little shield. The mockingbirds have been visiting their water for every few minutes. All winter only one came, then the sparrows and cardinals joined the water line.

Now there are 3 mocking birds here.

Fri. March 7, 1930

Rusty day today. Don't eat wind-tidying since (sludge). Colt 45 bottle, a typical March day. On a "hot line" this AM Car caught a large cat-fish and that weighed around 33 in 35 lbs. It was a giant. With the head off, Anita had to cut it in two pieces to put it in a large roaster.
March 24, 1930 - Mon.
Doves have been coming now for days. Snowbirds have been singing their little twittering songs, preparing to go south. I haven't seen any for some days now, perhaps they are gone.

Birds are singing by the millions apparently.

March 25, 1930, Tuesday.
Holiday today - Founder's Day.
Saw several chip sparrows singing in the oak tree today.
1 down in black cherry tree front gate. Long grass along side
on garden fence almost dead of Stable.

9 male cardinals singing in locust tree. A big stately certainly looked beautiful with the sun shining on his metallic feathers.

Violets are blooming in Carls

Garden - The forsythias have been blooming about a week or two and are wonderful, especially when the bright sun shines on them.

For the last 10 or 20 minutes (1:05 p.m.) a bird has been very vigorously, almost hardly then calling "shee weet, shee weet," over and over continuously. I think it was the mocking bird imitating a flycatcher + told mammy but finally I went out and away first plucked out of the small wild cherry tree. Then went to the one down at Black orchard, and then came back to a little apple tree by the raspberries. When I identified him, it's still screaming at the top of his voice.

A flicker just flew fly for about one or two
over bodies, over our woods, &
finally come to rest. Farming
in north Maine on Lakes Agi-\n
A meadow lark was sitting
in his orchard this Fri.
Saturday, March 29, 1930

the phoebe is still here. I
heard him calling at 4:11. He
must be lonesome without even
another mate around, let alone
his mate, who'll get here later.
I wonder if he came north alone
or did he just drop off here at his
old home. He seems to know
the place pretty well.

I have something else
to wonder about now. But in
the hammocks now, about 2:15
I heard "shwmp, shwmp." Each
note came out rapidly, but one
could not say sharply or harshly.
Up in the box I tree was
a small, slim, bird, about
the length of a sparrow on edge.
Shorter; slate-grey on back.

the back, head, wings, & tail.
Underneath grey side, white
but nearer grey, with dull
black stripe at hitches (i.e.
they were not elegant lines) several
down wide; starting at the top
of the breast or back neck and
extending down side to
legs or there about, close
up to wings on sides.

Slight indication of what
streak have been a faint yellow
grey call of about third, but
probably wasn't. Flitted &
rapidly about, hardly
the remaining still for an
appreciable length of time.
Changing position every second,
leaping back & forth from
limb to limb, 1 tree to tree,
constantly calling "shwmp" he
became interested when I answered,
but soon flew over to the
woods or apple tree. Repeatedly it
cought flies, gnats, etc.
the wing with all the delicacy of a flycatcher. Picked something off a bracken once. Had two dead leaves, very narrow, white, might have been just underside of feathers. Remains of one wing clipped somewhat at all places at first, but fins flatting outward them nicely. His eyes were black & shiny, I believe I think he had a slim bill.

He was in the locust tree, the will cherry, small cherry tree by corner of porch, in apple tree in garden, &c., slightly like female blackbird. Kirtland wins.

A pair of chickadees was in the garden & front yard for a while, & one then chased the other into the woods; I guess they’ll be mating before long.

Sunday, March 30, 1930
Went out for long walk today for first time in 4 weeks. Partly cloudy today, sun shining bright between.

Just before going down last slope to pond, I saw a number of little blackbirds high up in the sky. After looking at them I decided they were pine warblers, except I see now that Barnstar shows nothing for their tail. They were a bright i.e. heavy yellow on head, throat, neck, breast and underbody, and back also I believe, all overshadowed with a greenish cast - underbody from leg back gray-white - alive green wings & tail - tail deeply forked, about 1 inch in width - males there also - pales.

Saw them in several places around in woods, also one in back of house this eve. about 5:30.

In a few white & red - helastid or multibatcher, going around 4 around the trees. One cibly w as backing away at the back at the edge of a lichen on an oak.
Many bull-frogs croaking, but very poorly yet. One who was tuning up for the first time probably sounded like a large hen racking. A large slider upon a log in the pond. He vacated when he saw me.

Hundreds of small dapping eclectus. I saw a beautiful fox-sparrow on this edge of the pond. He was very bright and very tame. Two brown cranes, many titmice, chickadees, etc.

Anhinga which I think was probably the same one that been around the house was at the pond all this time I was there. Catching insects almost off the surface, and continually calling "shiver west, shiver west."

I went over toward the falls, looked back to the fallen down pine, and saw two little Carolina wrens in the leaves at its base. I looked them the glassed again and saw a small bird fly up into a tree. This beautiful oval golden wing identified him as a variseta warbler. He flew about, but when I got three feet later I couldn't find him anywhere in the woods. The marsh was thick with song sparrows, running on the heather down grass in the edge of the grass.
V down and getting a drink.

Swam another time over pond this moon. Got that he saw them

a week ago but I didn't.

By gosh, I've got to get shots and several

pine warblers in the bushes by

the pond.

Hundreds of song sparrows and

many tree sparrows singing

& walking in the marsh on the

dry grassland in the water.

[...]

 heard a weak, thin song

near pond, repeated several

times at intervals. I couldn't

locate any sparrows, but that it

might have been one of North's

song sparrows. If so I never

heard one sing like it before. "Sweet,
sweet, sweet, etc.

It seemed typical of warblers

some birds in the wind.

At falls, I heard a pretty

Kruser and knew it was a drake.

After a moment I placed

it! The Louisiana wren turned

when I saw for the first

time a year ago yesterday,

was there. After a few moments

I saw him bobbing among

the tree grasses, watching me.

He walked in the shallow water

as it went over the tiny fells,

walked side ways along the

steep banks, ducking under

the water for food.

Father the phalarope, who

has been singing down to

the shallow waters, dried

at him as we walked up

the overhanging banks. They sat near each

other a moment, the phalarope

flew off to Mr. L. W. Throck's

going about his business.

How long-billed marsh

wren in March. About noon

he had slid out in pond, two

in marsh. Hundreds of

Robins. I wish there were

thousands.
Several days and robins on way to Decoguan.
Quite a few fledglings in woods.
Read a jay—bird—just in long time.
Heard sea-gulls screaming flying over ever land for first time (March 27th).

Sat., April 13, 1930,
A brown thrasher was singing beautifully in the top of the persimmon tree, a perfect special number for me. He was in the bushes when I came back. First definitely.
One warbler—black blotted sides—gold throat & chest—black cheeks & face—white lore, al green to grey back—long bill—twill whitewing bars + white line across eye—white rump tail feathers.

April 13, 1930—Sunday.
A black & white warbler
singing—"su-wet, su-wet, su-wet,
Sometimes speaking up,
Many chiksadees & flickers,
several downy woodpeckers.
About a dozen or so more Louisiana water thrushes going three their country in the marsh far apart the pond. Chase each other about—prey limit in a big maple, about 15 feet from shore seemed a favorite. Several would sit on it and walk up & down, bobbing.
about, singing & running.
Alas! at like flicker.
Dashed in & out of large
rose bush, up & down
swamp, to fell, to back-
singing & calling all the
while.

Also another yellow-
throated Warbler.

Heard the first Whip-
Poor - We'll singing tonight.

April 19, 1880, Sat.

Coming back from
Woodbridge - heard a num-
ber of nestling in leaves - all
flew away in short junc
in very tame - resembled
very dry, but kept back
in all time so I

Saw Brown Thrasher

Saw Brown Thrasher
April 20, 1930 - Sunday

Saw Woodbridge play
first game of season - beat
Dundie 9 - 7 at Dunip six
Jeff 1 - 2 in Pumps.

Phoebe was in woods this
afternoon. Kept going "fat - fat -
I think of it all the time. Caught
bug on one limb. Then on another. "I finally
leapt out of hanging on feet
shoelace no gift.

Washed around in yard
and in woods. BL. With
wasp's singing

Thrushes in back
of chicken house. One
in woods this AM kept
calling "how - what - who -
why - seen?" If he appeared
intended. Same happened
to these two. When they
were in garden, sunny

Wild caraway come flying
north into woods. Lift
by old cellar. While
waiting for Bob. Brought
to get cake & bread several

Water Thrushes singing
over in Bulger's yard, near
Beards. Several hawks
About 6 or 8 around house
at noon. Saw ledge
violet across from
little fudge in hollow -
so thick they formed a velvet
rug - seemed a purple
phase - saw several

Brickbush cabbage I think
of acres of unpainted tuck
Down in McMahans
I saw many Azaleas
in a wind flowers. Pure white
intermingled with a great many
laughing hyacinths or other
wilds. The effect was very
Charming. Some seemed to
Come flow from fungi
on old road across from spring.
across potatoes.

On brush back of chicken house saw what I thought was a house wren, but it must have been a Carolina wren. So dark I couldn't tell for sure.

Several hawks today.

Many - canaries - skis. Scream tonight. A flock all that about 50 ducks flew over. Headed south, then darted over the house of sort again. Very low - sounds like strong wind - calling and quacking low and clearly. One went "gup gup gup gup gup.

Waxwing will sing tonight as every night, but only for a short while.

Aug. 4-1930: Heard singing my Whippoorwill on g Wik! fence barely audible at times.

April 21, 1930.

Nashville Warbler.
Myrtle Warbler.

April 23, 1930.

Yellow Palm Warbler - with labeled this as Nashville, but see now it couldn't have been. Dark gold underbody; darker streaks on sides - greenish gold lower back; and olive-green back and sides - red-brown crown.


Louisiana Water Thrush
Singing and hunting
"Indians and Yosemite, Maryland yellowthroat in tangled Purple Finchies, 16 to 20 kind - size of canaries.

Males deep rose-red on head, neck, and throat, and nape. Back rose,
Underside gray with a rose flush. 
Females gray with rose flush. 
Carried on continued chasney-like 
twitting in tops of tall oaks. Were 
peering themselves constantly. 
Since they flew in from the 
South, they may have part of 
finishing their migration flight 
and were resting up. 
They flew, a few remaining in 
skies, later following others. 

Soon found entire flock 
feeding in a beech tree, eating 
the catkins, flowers or what ever they 
are. 

With them were some white- 
throated sparrows which I had a 
terrible time identifying, looking at 
them from below, and not expecting 
them there. I took these notes:

Large birds, like chinspunt, they looked 
them somewhat plump, grayish; yellow 
cores; brown tail, forked; show white 
throat set off by black necklace or line 
shading off to streaks on gray body.

long tail. White supercilious line. 
Females' heavily spotted underside; 
white line over eye. 
I possibly was getting the females 
confused here, since a bottom view 
does not avoid distinguishing males.

All of these birds were very tame. 
I left my rifle at the base of the 
tree, climbed up among them, propped 
myself in various positions, examining 
them and taking notes. They fed 
all around me, no paying too 
least attention, attention or becoming 
at all frightened. I could not 
mange to get close them, as 
they were then feeding in the top 
of the tree, mainly, by now. 
They fed for about an hour 
while I watched them, and 
were still busy when I left. 
The leaves beneath the tree were 
liberally covered with droppings; 
and with parts of flowers dropped.
Nashville Warbler - I have this written down, but now at the date of copying (Dec 21, 1930) - I do not remember but what I may have meant a Yellow palm Warbler. However this may have been a Nashville. The first one today was a mistake.

No date - on back of page from April 21, I have March 30 notes. Then the next page has these notes at top, and then April 27+ notes from that day. I remember these dateless notes, taken while on way to road to get paper. Probably after 7, and date was for a second trip, to pond.

Black-throated Green Warbler.
Wilson's Warbler (Yellow Palm) - sang "sweet, sweet, sweet, few, few, few."

Pine Warbler
Black & White Warbler
Wilson's Warbler - looked very much like Female Bay Breasted - seemed similar, perhaps was female chestnut-sided

with some chestnut on sides.

Yellow-throated Warbler - sang "cheeky, cheeky, cheer."

Prairie Warbler.
Mystic Warbler.
Ruby-crowned Kinglet - called like a wren - "shut, shut, shut-tit, tittit."

April 27, Sunday.
First time I saw a season singing by precision tune.
A bird singing like "Mary Delia, come here, is the way we used to interpret it.
Vio Petra Warblers in the top of a tall maple in marsh, singing constantly in their scraping, twiddling way. "shoo, shoo, shoo, girl!"

Six or eight Purple Finches in top of a maple in marsh eating. Remained there all the time I was there. Not very active. Some broke with them now before which I thought might be pine siskin, as they
April 29, 1930
Near a warbler snug at 6:45 P.M. Over hill. Heard same warbler snugj in pine over hill while coming from train. That at first it was a

yellow warbler, but on better view saw he was a prairie warbler. Sang "sacht-sacht, utch-utch, utch-utch"? Very rapid—loud, clear, very queer, wavy or flute-like—sort of twanging.

Black & white warblers also.

May 1, 1930.
At Georgetown Rd.
Cardinal, English sparrows, starlings, crows, robins, swallows, swifts, chipping sparrows—etc.

Also several Wood-thrushes.

Many cardinals—first time this season.

Great many yellow warblers in trees, hedges, everywhere, mainly in upper parts of trees, never still, constantly flitting from place to place.

First of May for me.

Many white-throated sparrows.

All seen on car track back. 17 Biology Lab. Up to Bridger Track. Also in bushes back of lab.
At home—same day. Many chewinkes, robins, white-throated sparrows and thrushes scratching in leaves. A number of flickers. Cathwode.

One warbler sang "whet, whet, you whet", or "sweet, sweet, you sweet", or again "whet, whet, you whet". Traveled rapidly. Too dark to see.

Perhaps a hooded warbler? Have seen same trait in their several times lately in summer.

Heard whip poor—will.

Brige late this year—scarlet tanager, bee martin, and redstarts.

Swifts & swallows—seen for first time Sat. about two weeks ago.

Saw first flicker 2 or 3 weeks ago.

May 2, 1930.

Several bee martins or king birds here this evening about 7 o'clock, calling to me, telling me

Know they've arrived at last.
Yellow warbler in apple tree this A.M., about 6:45.

May 3, 1930.

Redstarts—here at last.
Cathwode—hooded warbler.
Black & white warbler.
Yellow-throated creeper.
Owl—creeper.
Hooded warbler.
Chewinkes.
Myrtle warbler.
Black-throated green warbler.
Yellow-billed cuckoo.
Summer tanagers.
Hawk.
Crow.
Prairie warbler.
White-throated sparrow.

In the song, I wrote this in red pencil, partly because the pencil was handy, partly because it was somewhat of a red-letter day in regard to species seen.
May 4, 1930.

1 Yellow Warbler.

Old yellow-throated Vireo eating

East Caterpillars in apple trees.

Wood (r) Busch.

Louisiana Water Thrush
Vireo.

Louisiana Water Thrushes
Male Maryland Yellowthroat.

Another

in

Shrub Cabbage & brown patch.

Vesper Warblers - one in

maple tree, others in Arnold in

woods. Song: Constantly "whoo-oo-

ur - yeah" sleeping, bubbling sound.

3d: 61/2' foot water snake.

Red-eyed (?) Vireo - "chee - up -where

is it - chee up there it is."

Mall Redstart.

A number of Black-throated Blue

Warblers - across lawn at folks in bushes

drinking. One high in sago catching

wrens. One wing - picking thru of gray

shoots - running down. Bird - quickly
tail like redstart.

Indigo Bunting - Caribe.

Fall 1936 - 16 squires - 3 - 11-11.

1928 - Middle of June - end of July - 17 year

locust

Fall & Winter - 1928 - 69 squires -

March 1928 - 2 false hawk - 83 yds.

Spring 1928 - Baltimore Orioles -

David 1 young male & 2 females.

Aug. 12, 1928 - 8 thousand of season - 6 ft. black.

1927 record - 13 snakes.

1928 - Idaho Squirting - nest

along path to road.

Aug. 12, 1928 - Stark rain for days - lots of

damages.

Aug. 18, 1928 - Rain squires back.

Hawk - Hay - snapping turtle - rabbit.

Aug. 19, 1928 - Shot 3 hawks.

Sept. 1, 1928 - 1 squires

Sept. 19, 1928 - 1 water snake - total 9 to date.

Oct. 20, 1928 - 7 black snake - total 11 to date.

Oct. 27, 1928 - Stripped 1 squires in gum tree

Killed 3 squirrels - 1 hawk.

Nov. 1, 1928 -

First White-throated Sparrow.

Nov. 28, 1928 - Carolina Wren - 9 squires.
Redstart here last summer.
Orchard oriole.
Summer tanager.
Flakes of tree birds—warbler,
ruby-throated, euphry, Chickadee,
9 woodpeckers.

1 rabbit near yard. 1 Red Fox
in corner's—fine work. Tiggey
happy was along but got off
trail.
1 rabbit—engulfed by Carl Hunt.
Have killed 7 rabbits, 3 squirrels,
3 have seen 3 squirrels.

Sat. Dec. 29, 1928
Chickadee—white-breasted nut-
hatker on path to road.

Jan. 5, 1929, Sat.

Watched 2 airplanes & sharp-shinned hawk.

Jan. 19, 1929, Sat.

Bluebirds & starlings singing in

garden—sparrow, wild-cats, wood Thrush—(late spring) within

Thurs., Jan. 24, 1929,

Ruby-throated, Chickadee, Titmouse.

on workhouse road.

Jan. 23, 1929, Sat.

Golden-crowned kinglet on
road near lower gate.

March 16, 1929, Sat.

About a dozen—chickens, the same
row of yellow-legged sparrow 6 or 8
downy & hair woodpeckers up by
castle woods.

March 17, Sunday.

1 sparrow in yard.

March 23, 1929, Sat.

7 wildcats—sparrow, junco,

wild canard. 1 family everywhere

Blackbirds, Jays & flickersat pond.
<table>
<thead>
<tr>
<th>Month</th>
<th>Trees</th>
<th>Flower</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>Cottonwood</td>
<td>Small - light - tinged</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green - red</td>
</tr>
<tr>
<td></td>
<td>Ash - Quaking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balsam of Gilseed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poplar - White</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maple - Norway</td>
<td>Soft - gray - green</td>
</tr>
<tr>
<td></td>
<td>Birch (most)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hornbeam</td>
<td>Soft - white - purple</td>
</tr>
<tr>
<td></td>
<td>Ash - Blue - purple stem</td>
<td></td>
</tr>
<tr>
<td>Late</td>
<td>Maple - Sugar</td>
<td>Delicate - yellow - hairy</td>
</tr>
<tr>
<td></td>
<td>Sugar oaks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oak - Red</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ash - Green</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>May</th>
<th>Trees</th>
<th>Flower</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oak - Black</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oak - White</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Beech</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hickory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Butternut</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Most of Ash</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maple - Striped</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tulip</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Birch - Gray</td>
<td></td>
</tr>
</tbody>
</table>
HOW TO USE KEITH'S TABLES.

EXAMPLE.

Wanted a Curve with an Ext. of about 12 ft. Angle of Intersection or I. P. = 23° 20' to the R. at Station 542+72.

Ext. in Tab. IV opposite 23° 20' = 120.87
120.87 ÷ 12 = 10.07. Say a 10° Curve.

Tan. in Tab. IV opp. 23° 20' = 1183.1
1183.1 + 10 = 118.31.

Tab. V correction for A. 23° 20' for a 10° Cur. = 0.16
118.31 + 0.16 = 118.47 = corrected Tangent.

(If corrected Ext. is required find in same way)
Ang. 23° 20' = 23.33° 
2° 19' = def. for sta. 542 | I. P. = sta. 542+72
4° 49' = " " " +50 Tan. = 1.1847
7° 19' = " " " 543
9° 49' = " " " +50 B. C. = sta. 541+53.53
11° 40' = " " " 543+
86.86 E. C. = Sta.
100 - 53.53 = 46.47 \times 3'(def. for 1 ft. of 10° Cur.) = 139.41' = 2° 19'/ = def. for sta. 542.

Def. for 50 ft. = 2° 30' for a 10° Curve,
Def. for 36.86 ft. = 1° 50'/ for a 10° Curve.

(These tables are published in Field Books of KEUFFEL & ESSER CO., New York, N. Y.)
**TABLE I. — Minutes in Decimals of a Degree.**

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>59.00</td>
<td>.22</td>
</tr>
<tr>
<td>10°</td>
<td>58.34</td>
<td>.30</td>
</tr>
<tr>
<td>90°</td>
<td>50.11</td>
<td>27.31</td>
</tr>
<tr>
<td>180°</td>
<td>50.00</td>
<td>26.50</td>
</tr>
<tr>
<td>270°</td>
<td>50.11</td>
<td>27.31</td>
</tr>
</tbody>
</table>

**TABLE II. — Inches in Decimals of a Foot.**

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>10°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>90°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>180°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>270°</td>
<td>71.10</td>
<td>.95</td>
</tr>
</tbody>
</table>

**TABLE III. — Radii, Ordinates and Deflections.**

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>10°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>90°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>180°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>270°</td>
<td>71.10</td>
<td>.95</td>
</tr>
</tbody>
</table>

**TABLE IV. — Tangents and Externals to a 1° Curve.**

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>10°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>90°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>180°</td>
<td>71.10</td>
<td>.95</td>
</tr>
<tr>
<td>270°</td>
<td>71.10</td>
<td>.95</td>
</tr>
</tbody>
</table>
### Table IV. — Tangents and Externals to a 1° Curve.

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent External</th>
<th>Angle</th>
<th>Tangent External</th>
<th>Angle</th>
<th>Tangent External</th>
<th>Angle</th>
<th>Tangent External</th>
</tr>
</thead>
<tbody>
<tr>
<td>31°</td>
<td>1589.0 216.3</td>
<td>41°</td>
<td>2142.2 387.4</td>
<td>51°</td>
<td>2732.9 618.4</td>
<td>61°</td>
<td>3275.0 920.2</td>
</tr>
<tr>
<td>31°</td>
<td>1589.0 216.3</td>
<td>41°</td>
<td>2142.2 387.4</td>
<td>51°</td>
<td>2732.9 618.4</td>
<td>61°</td>
<td>3275.0 920.2</td>
</tr>
<tr>
<td>50°</td>
<td>2142.2 387.4</td>
<td>50°</td>
<td>2142.2 387.4</td>
<td>50°</td>
<td>2142.2 387.4</td>
<td>50°</td>
<td>2142.2 387.4</td>
</tr>
</tbody>
</table>

### Table V. — Tangents and Externals to a 1° Curve.

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent External</th>
<th>Angle</th>
<th>Tangent External</th>
<th>Angle</th>
<th>Tangent External</th>
<th>Angle</th>
<th>Tangent External</th>
</tr>
</thead>
<tbody>
<tr>
<td>31°</td>
<td>1589.0 216.3</td>
<td>41°</td>
<td>2142.2 387.4</td>
<td>51°</td>
<td>2732.9 618.4</td>
<td>61°</td>
<td>3275.0 920.2</td>
</tr>
<tr>
<td>31°</td>
<td>1589.0 216.3</td>
<td>41°</td>
<td>2142.2 387.4</td>
<td>51°</td>
<td>2732.9 618.4</td>
<td>61°</td>
<td>3275.0 920.2</td>
</tr>
</tbody>
</table>
### TABLE IV. Tangents and Externals to a 1° Curve.

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>5880.5</td>
<td>2444.9</td>
<td>101°</td>
<td>6950.6</td>
<td>3278.1</td>
</tr>
<tr>
<td>10°</td>
<td>5847.5</td>
<td>2457.1</td>
<td>100°</td>
<td>6971.3</td>
<td>3294.1</td>
</tr>
<tr>
<td>20°</td>
<td>5811.7</td>
<td>2481.5</td>
<td>90°</td>
<td>7012.7</td>
<td>3452.6</td>
</tr>
<tr>
<td>30°</td>
<td>5885.8</td>
<td>2493.8</td>
<td>80°</td>
<td>7033.6</td>
<td>3432.2</td>
</tr>
<tr>
<td>40°</td>
<td>5850.6</td>
<td>2506.1</td>
<td>70°</td>
<td>7048.4</td>
<td>3385.8</td>
</tr>
<tr>
<td>50°</td>
<td>5815.7</td>
<td>2518.5</td>
<td>60°</td>
<td>7056.5</td>
<td>3342.6</td>
</tr>
<tr>
<td>60°</td>
<td>5802.7</td>
<td>2568.6</td>
<td>50°</td>
<td>7060.6</td>
<td>3319.4</td>
</tr>
<tr>
<td>70°</td>
<td>5820.2</td>
<td>2581.4</td>
<td>40°</td>
<td>7064.6</td>
<td>3292.2</td>
</tr>
<tr>
<td>80°</td>
<td>6037.8</td>
<td>2594.0</td>
<td>30°</td>
<td>7072.5</td>
<td>3280.3</td>
</tr>
<tr>
<td>90°</td>
<td>6053.4</td>
<td>2606.8</td>
<td>20°</td>
<td>7080.6</td>
<td>3255.2</td>
</tr>
<tr>
<td>100°</td>
<td>6073.1</td>
<td>2618.7</td>
<td>10°</td>
<td>7088.6</td>
<td>3241.2</td>
</tr>
<tr>
<td>110°</td>
<td>6060.8</td>
<td>2626.2</td>
<td>0°</td>
<td>7096.0</td>
<td>3235.2</td>
</tr>
<tr>
<td>120°</td>
<td>6046.6</td>
<td>2645.5</td>
<td>1°</td>
<td>7102.9</td>
<td>3234.2</td>
</tr>
<tr>
<td>130°</td>
<td>6016.8</td>
<td>2671.2</td>
<td>10°</td>
<td>7112.5</td>
<td>3229.2</td>
</tr>
<tr>
<td>140°</td>
<td>6019.3</td>
<td>2676.7</td>
<td>20°</td>
<td>7117.8</td>
<td>3227.7</td>
</tr>
<tr>
<td>150°</td>
<td>6000.8</td>
<td>2682.6</td>
<td>30°</td>
<td>7125.0</td>
<td>3225.3</td>
</tr>
<tr>
<td>160°</td>
<td>5960.5</td>
<td>2698.4</td>
<td>40°</td>
<td>7133.4</td>
<td>3223.2</td>
</tr>
<tr>
<td>170°</td>
<td>5926.2</td>
<td>2715.5</td>
<td>50°</td>
<td>7141.4</td>
<td>3221.3</td>
</tr>
<tr>
<td>180°</td>
<td>5887.8</td>
<td>2729.7</td>
<td>60°</td>
<td>7149.4</td>
<td>3219.5</td>
</tr>
<tr>
<td>190°</td>
<td>5847.4</td>
<td>2743.5</td>
<td>70°</td>
<td>7157.5</td>
<td>3218.0</td>
</tr>
<tr>
<td>200°</td>
<td>5805.7</td>
<td>2757.8</td>
<td>80°</td>
<td>7165.6</td>
<td>3216.6</td>
</tr>
<tr>
<td>210°</td>
<td>5758.5</td>
<td>2771.2</td>
<td>90°</td>
<td>7173.6</td>
<td>3215.4</td>
</tr>
<tr>
<td>220°</td>
<td>5707.9</td>
<td>2785.0</td>
<td>100°</td>
<td>7181.4</td>
<td>3214.3</td>
</tr>
<tr>
<td>230°</td>
<td>5653.9</td>
<td>2798.3</td>
<td>110°</td>
<td>7189.2</td>
<td>3213.3</td>
</tr>
<tr>
<td>240°</td>
<td>5597.8</td>
<td>2811.4</td>
<td>120°</td>
<td>7196.9</td>
<td>3212.4</td>
</tr>
<tr>
<td>250°</td>
<td>5539.7</td>
<td>2823.2</td>
<td>130°</td>
<td>7204.6</td>
<td>3211.6</td>
</tr>
<tr>
<td>260°</td>
<td>5480.5</td>
<td>2834.3</td>
<td>140°</td>
<td>7212.3</td>
<td>3210.9</td>
</tr>
<tr>
<td>270°</td>
<td>5428.3</td>
<td>2844.9</td>
<td>150°</td>
<td>7219.9</td>
<td>3210.3</td>
</tr>
<tr>
<td>280°</td>
<td>5373.8</td>
<td>2854.3</td>
<td>160°</td>
<td>7227.5</td>
<td>3209.7</td>
</tr>
<tr>
<td>290°</td>
<td>5318.2</td>
<td>2863.7</td>
<td>170°</td>
<td>7235.1</td>
<td>3209.2</td>
</tr>
<tr>
<td>300°</td>
<td>5261.6</td>
<td>2872.6</td>
<td>180°</td>
<td>7242.5</td>
<td>3208.8</td>
</tr>
<tr>
<td>310°</td>
<td>5203.0</td>
<td>2881.4</td>
<td>190°</td>
<td>7250.1</td>
<td>3208.5</td>
</tr>
<tr>
<td>320°</td>
<td>5142.7</td>
<td>2889.1</td>
<td>200°</td>
<td>7257.6</td>
<td>3208.2</td>
</tr>
</tbody>
</table>

### TABLE V. Corrections for use with Table IV.

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>10°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>20°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>30°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>40°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>50°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>60°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>70°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>80°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>90°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
</tbody>
</table>

For Tangents Add

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>10°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>20°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>30°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>40°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>50°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>60°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>70°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>80°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
<tr>
<td>90°</td>
<td>6000.6</td>
<td>3246.5</td>
</tr>
</tbody>
</table>

For Externals Add

<table>
<thead>
<tr>
<th>Angle</th>
<th>Tangent</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>10°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>20°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>30°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>40°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>50°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>60°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>70°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>80°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
<tr>
<td>90°</td>
<td>5836.7</td>
<td>4836.1</td>
</tr>
</tbody>
</table>
TABLE VI. Deflections for Sub Chords for Short Radius Curves.

<table>
<thead>
<tr>
<th>Degree</th>
<th>Radius of Curve</th>
<th>Curves</th>
<th>$\frac{1}{2}$ sub chord</th>
<th>Length of arc for 100 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>36°</td>
<td>193.18</td>
<td>1° 21'</td>
<td>17.5° 43'</td>
<td>101.15</td>
</tr>
<tr>
<td>32°</td>
<td>191.39</td>
<td>1° 25'</td>
<td>20.5° 43'</td>
<td>101.33</td>
</tr>
<tr>
<td>28°</td>
<td>171.01</td>
<td>2° 06'</td>
<td>23.5° 21'</td>
<td>101.66</td>
</tr>
<tr>
<td>24°</td>
<td>181.30</td>
<td>2° 21'</td>
<td>26.5° 21'</td>
<td>101.98</td>
</tr>
<tr>
<td>20°</td>
<td>161.80</td>
<td>2° 31'</td>
<td>29.5° 44'</td>
<td>102.06</td>
</tr>
<tr>
<td>16°</td>
<td>150.19</td>
<td>2° 37'</td>
<td>32.5° 44'</td>
<td>102.14</td>
</tr>
<tr>
<td>12°</td>
<td>135.52</td>
<td>2° 39'</td>
<td>35.5° 44'</td>
<td>102.15</td>
</tr>
<tr>
<td>8°</td>
<td>122.92</td>
<td>2° 42'</td>
<td>38.5° 44'</td>
<td>102.76</td>
</tr>
<tr>
<td>4°</td>
<td>114.06</td>
<td>2° 46'</td>
<td>41.5° 44'</td>
<td>103.40</td>
</tr>
<tr>
<td>0°</td>
<td>108.50</td>
<td>2° 50'</td>
<td>44.5° 44'</td>
<td>104.43</td>
</tr>
<tr>
<td>103°</td>
<td>115.33</td>
<td>2° 55'</td>
<td>47.5° 44'</td>
<td>104.72</td>
</tr>
</tbody>
</table>

**CURVE FORMULAS**

- $T = R \tan \frac{1}{2} I$
- $T = \frac{R \sin D}{2}$
- $R = T \cot \frac{1}{2} I$
- $R = \frac{R \sin D}{\sin D}$

**Chord def. = chord^2 / 2**

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

Table IV. contains Tangents and Extremals to a 1° curve. Tan. and Ext. to any other radius may be found nearly enough, by dividing the Tan. or Ext. opposite the given Central Angle by the given degree of curve.

To find Def. of Curve, having the Central Angle and Tangent: Divide Tan. opposite the given Central Angle by the given tangent.

To find Def. of Curve, having the Central Angle and Extremal: Divide Ext. opposite the given Central Angle by the given Extremal.

To find Nat. Tan. and Nat. Ex. Sec. for any angle by Table IV.: Tan. or Ext. of the given angle divided by the radius of a 1° curve will be the Nat. Tan. or Nat. Ex. Sec.

To find angle for a given distance and deflection.

**Rule 1.** Multiply the given distance by .01745 (def. for 1° for 1 ft.), and divide given deflection by the product.

**Rule 2.** Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and divide the product by the distance.

**RIGHT ANGLE TRIANGLES.** Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10. 100^2 + 200 = 5, 100^2 + 5 = 100^2 hyp.

Given Hyp. 100, Alt. 25. 25^2 + 200 = 5, 125. 100 - 3.125 = 96.875. Base.

Error in first example, .0023. In last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.
<table>
<thead>
<tr>
<th>Deg</th>
<th>0'</th>
<th>10'</th>
<th>20'</th>
<th>30'</th>
<th>40'</th>
<th>50'</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.9000</td>
<td>0.0920</td>
<td>0.0358</td>
<td>0.0087</td>
<td>0.0116</td>
<td>0.0145</td>
</tr>
<tr>
<td>1</td>
<td>0.1770</td>
<td>0.2024</td>
<td>0.2233</td>
<td>0.2022</td>
<td>0.2932</td>
<td>0.3220</td>
</tr>
<tr>
<td>2</td>
<td>0.3490</td>
<td>0.3780</td>
<td>0.4070</td>
<td>0.4369</td>
<td>0.4656</td>
<td>0.4940</td>
</tr>
<tr>
<td>3</td>
<td>0.5240</td>
<td>0.5533</td>
<td>0.5826</td>
<td>0.6109</td>
<td>0.6382</td>
<td>0.6646</td>
</tr>
<tr>
<td>4</td>
<td>0.6960</td>
<td>0.7270</td>
<td>0.7580</td>
<td>0.7878</td>
<td>0.8161</td>
<td>0.8446</td>
</tr>
<tr>
<td>5</td>
<td>0.8719</td>
<td>0.9054</td>
<td>0.9393</td>
<td>0.9734</td>
<td>1.0076</td>
<td>1.0416</td>
</tr>
<tr>
<td>6</td>
<td>1.0450</td>
<td>1.0810</td>
<td>1.1170</td>
<td>1.1530</td>
<td>1.1890</td>
<td>1.2250</td>
</tr>
<tr>
<td>7</td>
<td>1.2157</td>
<td>1.2570</td>
<td>1.3170</td>
<td>1.3760</td>
<td>1.4350</td>
<td>1.4950</td>
</tr>
<tr>
<td>8</td>
<td>1.3809</td>
<td>1.4350</td>
<td>1.4950</td>
<td>1.5550</td>
<td>1.6150</td>
<td>1.6750</td>
</tr>
<tr>
<td>9</td>
<td>1.5494</td>
<td>1.6144</td>
<td>1.6753</td>
<td>1.7363</td>
<td>1.7973</td>
<td>1.8583</td>
</tr>
<tr>
<td>10</td>
<td>1.7153</td>
<td>1.7823</td>
<td>1.8383</td>
<td>1.8943</td>
<td>1.9503</td>
<td>1.9863</td>
</tr>
<tr>
<td>11</td>
<td>1.8794</td>
<td>1.9474</td>
<td>2.0054</td>
<td>2.0614</td>
<td>2.1174</td>
<td>2.1734</td>
</tr>
<tr>
<td>12</td>
<td>2.0392</td>
<td>2.1072</td>
<td>2.1672</td>
<td>2.2232</td>
<td>2.2792</td>
<td>2.3352</td>
</tr>
<tr>
<td>13</td>
<td>2.1959</td>
<td>2.2639</td>
<td>2.3229</td>
<td>2.3809</td>
<td>2.4389</td>
<td>2.4969</td>
</tr>
<tr>
<td>14</td>
<td>2.3496</td>
<td>2.4176</td>
<td>2.4756</td>
<td>2.5336</td>
<td>2.5916</td>
<td>2.6496</td>
</tr>
<tr>
<td>15</td>
<td>2.4996</td>
<td>2.5676</td>
<td>2.6256</td>
<td>2.6836</td>
<td>2.7416</td>
<td>2.7996</td>
</tr>
<tr>
<td>16</td>
<td>2.6460</td>
<td>2.7140</td>
<td>2.7820</td>
<td>2.8410</td>
<td>2.9000</td>
<td>2.9580</td>
</tr>
<tr>
<td>17</td>
<td>2.7889</td>
<td>2.8569</td>
<td>2.9249</td>
<td>2.9929</td>
<td>3.0609</td>
<td>3.1289</td>
</tr>
<tr>
<td>18</td>
<td>2.9270</td>
<td>3.0050</td>
<td>3.0830</td>
<td>3.1610</td>
<td>3.2390</td>
<td>3.3170</td>
</tr>
<tr>
<td>19</td>
<td>3.0603</td>
<td>3.1383</td>
<td>3.2163</td>
<td>3.2943</td>
<td>3.3723</td>
<td>3.4503</td>
</tr>
<tr>
<td>20</td>
<td>3.1900</td>
<td>3.2680</td>
<td>3.3460</td>
<td>3.4240</td>
<td>3.5020</td>
<td>3.5800</td>
</tr>
</tbody>
</table>

Natural Cotangents.
### Distances from Center of Roadway for Cross-Sectioning

Roadway 14 feet wide. Side Slopes 1½ to 1. For Single Track Embankment.

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>.1</th>
<th>.2</th>
<th>.3</th>
<th>.4</th>
<th>.5</th>
<th>.6</th>
<th>.7</th>
<th>.8</th>
<th>.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7.0</td>
<td>7.2</td>
<td>7.3</td>
<td>7.5</td>
<td>7.6</td>
<td>7.8</td>
<td>7.9</td>
<td>8.1</td>
<td>8.2</td>
<td>8.4</td>
</tr>
<tr>
<td>1</td>
<td>8.5</td>
<td>8.7</td>
<td>8.8</td>
<td>9.0</td>
<td>9.1</td>
<td>9.3</td>
<td>9.4</td>
<td>9.6</td>
<td>9.7</td>
<td>9.9</td>
</tr>
<tr>
<td>2</td>
<td>10.0</td>
<td>10.2</td>
<td>10.3</td>
<td>10.5</td>
<td>10.6</td>
<td>10.8</td>
<td>10.9</td>
<td>11.1</td>
<td>11.2</td>
<td>11.4</td>
</tr>
<tr>
<td>3</td>
<td>11.5</td>
<td>11.7</td>
<td>11.8</td>
<td>12.0</td>
<td>12.1</td>
<td>12.3</td>
<td>12.4</td>
<td>12.6</td>
<td>12.7</td>
<td>12.9</td>
</tr>
<tr>
<td>4</td>
<td>13.0</td>
<td>13.2</td>
<td>13.3</td>
<td>13.5</td>
<td>13.6</td>
<td>13.8</td>
<td>13.9</td>
<td>14.1</td>
<td>14.2</td>
<td>14.4</td>
</tr>
<tr>
<td>5</td>
<td>14.5</td>
<td>14.7</td>
<td>14.8</td>
<td>15.0</td>
<td>15.1</td>
<td>15.3</td>
<td>15.4</td>
<td>15.6</td>
<td>15.7</td>
<td>15.9</td>
</tr>
<tr>
<td>6</td>
<td>16.0</td>
<td>16.2</td>
<td>16.3</td>
<td>16.5</td>
<td>16.6</td>
<td>16.8</td>
<td>16.9</td>
<td>17.1</td>
<td>17.2</td>
<td>17.4</td>
</tr>
<tr>
<td>7</td>
<td>17.5</td>
<td>17.7</td>
<td>17.8</td>
<td>18.0</td>
<td>18.1</td>
<td>18.3</td>
<td>18.4</td>
<td>18.6</td>
<td>18.7</td>
<td>18.9</td>
</tr>
<tr>
<td>8</td>
<td>19.0</td>
<td>19.2</td>
<td>19.3</td>
<td>19.5</td>
<td>19.6</td>
<td>19.8</td>
<td>19.9</td>
<td>20.1</td>
<td>20.2</td>
<td>20.4</td>
</tr>
<tr>
<td>9</td>
<td>20.5</td>
<td>20.7</td>
<td>20.8</td>
<td>21.0</td>
<td>21.1</td>
<td>21.3</td>
<td>21.4</td>
<td>21.6</td>
<td>21.7</td>
<td>21.9</td>
</tr>
<tr>
<td>10</td>
<td>22.0</td>
<td>22.2</td>
<td>22.3</td>
<td>22.5</td>
<td>22.6</td>
<td>22.8</td>
<td>22.9</td>
<td>23.1</td>
<td>23.2</td>
<td>23.4</td>
</tr>
<tr>
<td>11</td>
<td>23.5</td>
<td>23.7</td>
<td>23.8</td>
<td>24.0</td>
<td>24.1</td>
<td>24.3</td>
<td>24.4</td>
<td>24.6</td>
<td>24.7</td>
<td>24.9</td>
</tr>
<tr>
<td>12</td>
<td>25.0</td>
<td>25.2</td>
<td>25.3</td>
<td>25.5</td>
<td>25.6</td>
<td>25.8</td>
<td>25.9</td>
<td>26.1</td>
<td>26.2</td>
<td>26.4</td>
</tr>
<tr>
<td>13</td>
<td>26.5</td>
<td>26.7</td>
<td>26.8</td>
<td>27.0</td>
<td>27.1</td>
<td>27.3</td>
<td>27.4</td>
<td>27.6</td>
<td>27.7</td>
<td>27.9</td>
</tr>
<tr>
<td>14</td>
<td>28.0</td>
<td>28.2</td>
<td>28.3</td>
<td>28.5</td>
<td>28.6</td>
<td>28.8</td>
<td>28.9</td>
<td>29.1</td>
<td>29.2</td>
<td>29.4</td>
</tr>
<tr>
<td>15</td>
<td>29.5</td>
<td>29.7</td>
<td>29.8</td>
<td>30.0</td>
<td>30.1</td>
<td>30.3</td>
<td>30.4</td>
<td>30.6</td>
<td>30.7</td>
<td>30.9</td>
</tr>
<tr>
<td>16</td>
<td>31.0</td>
<td>31.2</td>
<td>31.3</td>
<td>31.5</td>
<td>31.6</td>
<td>31.8</td>
<td>31.9</td>
<td>32.1</td>
<td>32.2</td>
<td>32.4</td>
</tr>
<tr>
<td>17</td>
<td>32.5</td>
<td>32.7</td>
<td>32.8</td>
<td>33.0</td>
<td>33.1</td>
<td>33.3</td>
<td>33.4</td>
<td>33.6</td>
<td>33.7</td>
<td>33.9</td>
</tr>
<tr>
<td>18</td>
<td>34.0</td>
<td>34.2</td>
<td>34.3</td>
<td>34.5</td>
<td>34.6</td>
<td>34.8</td>
<td>34.9</td>
<td>35.1</td>
<td>35.2</td>
<td>35.4</td>
</tr>
<tr>
<td>19</td>
<td>35.5</td>
<td>35.7</td>
<td>35.8</td>
<td>36.0</td>
<td>36.1</td>
<td>36.3</td>
<td>36.4</td>
<td>36.6</td>
<td>36.7</td>
<td>36.9</td>
</tr>
<tr>
<td>20</td>
<td>37.0</td>
<td>37.2</td>
<td>37.3</td>
<td>37.5</td>
<td>37.6</td>
<td>37.8</td>
<td>37.9</td>
<td>38.1</td>
<td>38.2</td>
<td>38.4</td>
</tr>
<tr>
<td>21</td>
<td>38.5</td>
<td>38.7</td>
<td>38.8</td>
<td>39.0</td>
<td>39.1</td>
<td>39.3</td>
<td>39.4</td>
<td>39.6</td>
<td>39.7</td>
<td>39.9</td>
</tr>
<tr>
<td>22</td>
<td>40.0</td>
<td>40.2</td>
<td>40.3</td>
<td>40.5</td>
<td>40.6</td>
<td>40.8</td>
<td>40.9</td>
<td>41.1</td>
<td>41.2</td>
<td>41.4</td>
</tr>
<tr>
<td>23</td>
<td>41.5</td>
<td>41.7</td>
<td>41.8</td>
<td>42.0</td>
<td>42.1</td>
<td>42.3</td>
<td>42.4</td>
<td>42.6</td>
<td>42.7</td>
<td>42.9</td>
</tr>
<tr>
<td>24</td>
<td>43.0</td>
<td>43.2</td>
<td>43.3</td>
<td>43.5</td>
<td>43.6</td>
<td>43.8</td>
<td>43.9</td>
<td>44.1</td>
<td>44.2</td>
<td>44.4</td>
</tr>
<tr>
<td>25</td>
<td>44.5</td>
<td>44.7</td>
<td>44.8</td>
<td>45.0</td>
<td>45.1</td>
<td>45.3</td>
<td>45.4</td>
<td>45.6</td>
<td>45.7</td>
<td>45.9</td>
</tr>
<tr>
<td>26</td>
<td>46.0</td>
<td>46.2</td>
<td>46.3</td>
<td>46.5</td>
<td>46.6</td>
<td>46.8</td>
<td>46.9</td>
<td>47.1</td>
<td>47.2</td>
<td>47.4</td>
</tr>
<tr>
<td>27</td>
<td>47.5</td>
<td>47.7</td>
<td>47.8</td>
<td>48.0</td>
<td>48.1</td>
<td>48.3</td>
<td>48.4</td>
<td>48.6</td>
<td>48.7</td>
<td>48.9</td>
</tr>
<tr>
<td>28</td>
<td>49.0</td>
<td>49.2</td>
<td>49.3</td>
<td>49.5</td>
<td>49.6</td>
<td>49.8</td>
<td>49.9</td>
<td>50.1</td>
<td>50.2</td>
<td>50.4</td>
</tr>
<tr>
<td>29</td>
<td>50.5</td>
<td>50.7</td>
<td>50.8</td>
<td>51.0</td>
<td>51.1</td>
<td>51.3</td>
<td>51.4</td>
<td>51.6</td>
<td>51.7</td>
<td>51.9</td>
</tr>
<tr>
<td>30</td>
<td>52.0</td>
<td>52.2</td>
<td>52.3</td>
<td>52.5</td>
<td>52.6</td>
<td>52.8</td>
<td>52.9</td>
<td>53.1</td>
<td>53.2</td>
<td>53.4</td>
</tr>
<tr>
<td>31</td>
<td>53.5</td>
<td>53.7</td>
<td>53.8</td>
<td>54.0</td>
<td>54.1</td>
<td>54.3</td>
<td>54.4</td>
<td>54.6</td>
<td>54.7</td>
<td>54.9</td>
</tr>
<tr>
<td>32</td>
<td>55.0</td>
<td>55.2</td>
<td>55.3</td>
<td>55.5</td>
<td>55.6</td>
<td>55.8</td>
<td>55.9</td>
<td>56.1</td>
<td>56.2</td>
<td>56.4</td>
</tr>
<tr>
<td>33</td>
<td>56.5</td>
<td>56.7</td>
<td>56.8</td>
<td>57.0</td>
<td>57.1</td>
<td>57.3</td>
<td>57.4</td>
<td>57.6</td>
<td>57.7</td>
<td>57.9</td>
</tr>
<tr>
<td>34</td>
<td>58.0</td>
<td>58.2</td>
<td>58.3</td>
<td>58.5</td>
<td>58.6</td>
<td>58.8</td>
<td>58.9</td>
<td>59.1</td>
<td>59.2</td>
<td>59.4</td>
</tr>
<tr>
<td>35</td>
<td>59.5</td>
<td>59.7</td>
<td>59.8</td>
<td>60.0</td>
<td>60.1</td>
<td>60.3</td>
<td>60.4</td>
<td>60.6</td>
<td>60.7</td>
<td>60.9</td>
</tr>
<tr>
<td>36</td>
<td>61.0</td>
<td>61.2</td>
<td>61.3</td>
<td>61.5</td>
<td>61.6</td>
<td>61.8</td>
<td>62.0</td>
<td>62.2</td>
<td>62.4</td>
<td>62.6</td>
</tr>
</tbody>
</table>

Calculated by Julien A. Hall, M. Am. Soc. C. E.