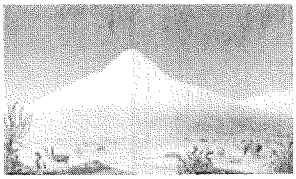
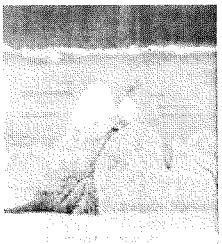
Meeting 16 • 27 February 2014
Week 8: Rocks & soil, weather & water (cont'd.); Stars & numbers

Version: **2/27/14**

pictures of the week



Mt. Chimborazo, illustration from Humboldt's time



Humboldt's iconic engraving of Mt. Chimborazo

thought-bite of the week:

"I reckoned that it was my duty in this book to record all the data obtained from reliable sources…, investigate the causes and relations, and establish fixed points in the rapid course of time…"

(Humboldt, "Personal Narrative", from *Jaguars and Electric Eels*, ed. & trans. Wilson, p. 19)

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mini-text of the week (start):

"…we forgot that there might be dangers descending steep slopes covered with a smooth, slippery grass in the dark."

Humboldt, "Personal Narrative", from *Jaguars and Electric Eels*, ed. & trans. Wilson, pp. 17-18 (read more)

Topics for today (key to symbols)

• (10') This week's thought-bite (and also the theme of "Stars & Numbers"): expensive instruments, extreme conditions, and progressive insights into geography, climate, and species distribution.

Small groups:

1) Which of the planets can be seen by the naked eye? Common binoculars? Which have you yourself seen?
2) Assume you're standing on top of some PSU building. At what time of day / night might you see the full moon over Mt. Hood? Two weeks later (or before), where would you look to see the new moon?
3) What are the largest / most powerful telescope and microscope you have ever looked through? What did you see? How powerful is whatever such instrument you yourself possess or once possessed?
4) Have you ever been in a place that is really really (totally?) dark /quiet? (totally except for "natural" light and sounds?). Light pollution as particular annoyance to astronomers; what they do about it that relates to sustainable environmentalism.

Whole group:

Magnification (and the misconception about "power"); light-gathering; the importance of stable mountings and precise angular measurement; cost (in relation to size; then and now)

Humboldt's portable instruments: a) the portrait of H&B at their research table; b) out in the field

near Chimborazo.

The portable telescopes of Humboldt's time: 1) superbrief history of telescope from 1608 into 21st C; 2) telescopes of the 18th C, including 3) the one that Capt. Cook used for advanced astronomical observation on his voyages; 4) telescopes of the 19th C; 5) history of the observatory; 6) stationery telescopes and their astronomers: Wilhelm / William Herschel; 7) the Paris Observatory - Humboldt would have known it well; 8) the Berlin Observatory - Humboldt would have been quite familiar with it too, especially after his travels; 9) the US Naval Observatory, the major center of American astronomy around 1800; 10) two sources of interest to us as we deal with the unavoidable and very complex issue of science and religion: the Vatican Observatory; Wikipedia: "Catholic Church and science"; 11) something to think about the next time you sing "Auld Lang Syne" at Times Square :-)

Good topic for a group project: archaeoastronomy and ethnoastronomy – explanation; sample lesson plan for "A web-based activity exploring how different cultures have interpreted constellations".

(02') About geological dating - how late the scale was determined with radiometric dating back to creation of the earth / sun. Info from the Palmer geology book.

- (10') This week's mini-text about plant distribution: It's not just that the distribution of species varies with altitude, as it varies with latitude and climate; the same or similar species appear in similar zones that are separated by barriers like mountains that - once geology was mature enough to recognize this - may have arisen to isolate those species from each other. There was much effort to distinguish closely related species and to determine which were variants of ONE species and which were truly species of their own. Definition of species then was based on reproduction (the reproductive parts of the plants; the possibility of fertile mating); that principle has yielded to cladistics and classification by shared genes). A thorny related problem: How to tell whether a newly-encountered being is a member of species X, say our own species.

  Small groups: put forth your own definition of "human". ("If it looks like duck, and if it waddles like a duck, and if it quacks like a duck..."). The old "featherless biped" joke.

- (10') Back to astronomy and measurement. So how did they make those telescopes and such - the actual handiwork and critical measuring? A demonstration of mirror grinding, polishing, and surface-accuracy measurement.

- (05') Species descriptions, with work samples. Important: Don't write as though you yourself were the audience, as though you were writing a biology paper, or even as though I were the ultimate audience. Picture a distinct category of learner and work from there. Hallmarks / gauges of strong species descriptions / group projects: 1) Is it about you or about sustainable environmentalism and AvH? 2) Will your audience learn ABOUT or learn TO, or both? 3) Could a teacher use your activity a) as is; b) by adding something to it? 4) Does it contribute balance to a larger effort (or is it just another take on the penguin / squid)? 5) Could you confidently present it publicly? Example: PSU Student Research Symposium. Maybe a couple of our people will present their ideas.

- (05') Examples of lesson plans that can guide species descriptions and some group projects: 1) see handout for previous meeting; b) here is "ThirteenEd Online", about lesson plans (example: math). For the Bigger Picture about principles, stakeholders, etc., see PSU/Oregon "STEM+German" grant-funded project.

- (05') If time (probably not): grants, jobs, résumé lines through PSU Institute for Sustainable Solutions; grants and conferences elsewhere; see earlier handouts for examples of internships. More soon about documenting your skills / achievements and the larger topic of employability. Want group feedback about how much to do this.

- (01') Coffee / snack after class? Lunch / Coffee Friday noonish? - 12:30 or 1:00 even better for lunch, or 1:30 for coffee

- (20') Humboldt's pioneering work in plant (and animal) geography: the 99% perspiration and data are combined with 1% inspiration and insight to produce the monumental, iconic "Chimborazo" graphic. That was the best they had "back then" about sustainable environmentalism: the data, the

thought, the presentation in words and pictures. There was NO "Big Science": no government-sponsored science (until late in 19thC in US - Powell's fights), no corporate-financed R&D. Well, there was a little, especially for military purposes (mapping, weapons). But most science was "amateur" (gentleman and a few others), because science then was not regarded as important. Producing that engraving involved huge effort and expense, even after the data was collected.

Today we'll rotate some important graphics resources among small groups so that people can look closely at them: the full-size Chimborazo engraving (with the English translation of its data columns); several centuries of maps of the Pacific Northwest; a study of effective graphic representation of quantitative data (Tufte, The Visual Representation of Quantitative Information); a study of how the familiar "time-line" graphic tool was developed over thousands of years (Rosenberg & Grafton, Cartographies of Time).

–Some other "iconic" images related to science (whether as concepts or as means to deliver data effectively).

–Special points: natural history collections; rarity of travel; topographic mapping (Wikipedia; Geosciences, Idaho State U)

- Some midterms returned at end. More next Tuesday.

- On the horizon:

Soon: A last quantification activity: precise measurement of altitude / distance (demo, then do in groups). Thought questions: Are all angles and degrees created equal? Why use a barometer to measure altitude when the theodolites and trig tables are there? Margins for error in Humboldt's time and our own: latitude, longitude, altitude, temperature; news flash: PSU Building World's Biggest Barometer!!

Soon: How did/do people "feel" about nature and environmentalism? (NOT expressing opinions, but rather the psychological / emotional sense, including how we can encounter their thoughts / emotions

Soon: topographical mapping and iso-dimensions

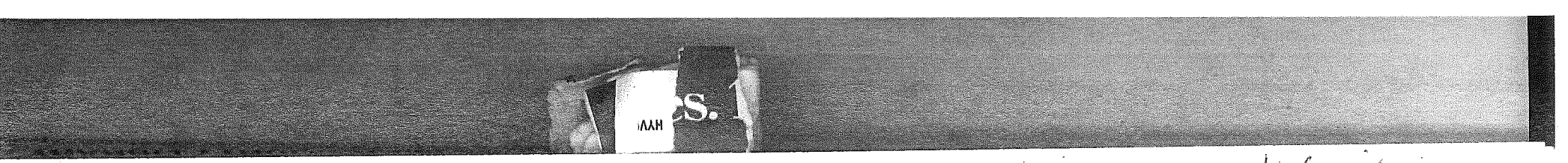
Looking further ahead (projects, etc.): presentation (continuation) about educational standards and their parts in the course: 1) Improving your learnign by helping others to learn - This is preparation for assignments about species description and group projects.

looking ahead: presentation of project ideas (just the ideas, not finished projects) at meeting #16

Upcoming: presentation about society back then (and any time before 1800 or so), to help understand how H related to people of other classes / races (teaser: When was it that someone's ears first popped with a change in altitude?)

advice about "educated citizen" reading, with a short sample

What/how do we FEEL about sustainable environmentalism? Not our opinions, but rather our emotions - and also how such emotions have been expressed through time and in various cultures.



Within these major divisions, a chronological sequence of systems was defined such as the Silurian and Devonian, based on distinctive and often regionally located successions of strata, with characteristic fossils. It was the actual rock and its varied content, including fossils, which provided the material basis that geologists were trying to place within the abstract continuum of Earth Time.

The fossils often represent particular episodes in the history of life. For example, the Devonian was thought to preserve the early development of the fishes and the Jurassic to preserve part of the dinosaur story along with that of their aquatic and flying relatives. Paradoxically, however, the Jurassic strata of the Jura Mountains, by which the period was first recognised, are mostly marine and do not contain many fossils of the terrestrial dinosaurs.

There was an inherent duality in the scheme. Although the chronology of Earth Time is essentially a continuum, it was recorded and represented by 'unit' sequences of rock strata (the study of which is called chronostratigraphy). It gradually became clear to geologists that the boundaries of successive units often represent gaps in the record of deposition. And when the matching of unit boundaries was attempted on a regional or global scale, it was evident that they were not necessarily synchronous and often overlap. The business of sorting out such discrepancies was and still is highly contentious as contenders vie with one another to promote the claims of their favoured stratigraphic successions.

It became quite clear why such problems were arising. At any one time, contemporary deposits are laid down in any number of different sedimentary environments around the world, ranging from desert sands to glacial moraine and tropical reef carbonates. The boundaries between different environments of deposition shift over time as for instance deserts, ice sheets or seas expand or shrink with continuous climate change and the movement of the continents and oceans.

Although the major divisions of Earth Time were established by the end of the nineteenth century, geologists had to spend the next hundred years and more trying to make the scheme more workable and sort out its inherent contradictions. Even by 1881 when the second International Geological Congress met in Bologna,

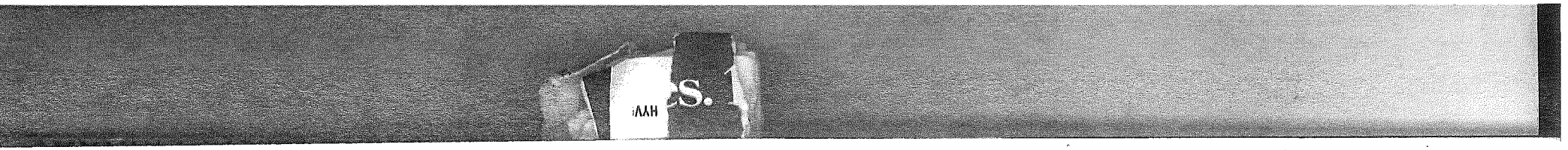
everyone acknowledged that some sort of international agreement was necessary so that geologists around the world use the same divisional names for Earth Time in a consistent way.

For example, any reference to the base of the Devonian System of strata and the beginning of the Devonian Period of Earth Time is now 'based' on a fixed point in a continuous sequence of fossiliferous seabed sedimentary strata. Despite the fact that the Devonian System is so named after the county of Devon in southwest England, it was discovered that the sequence of strata from the top of the Silurian System is not present in Devon. Consequently, the base of the Devonian ended up located within an equally historic region, namely Joachim Barrande's Bohemia.

It took the best part of 100 years before the Bologna initiative became a practicality. Eventually, in 1972 the first internationally agreed system boundary to be formally marked was that of the Siluro-Devonian. The specific locality is the euphonically named Klonk section near the village of Suchomasty in the Czech Republic. Ceremonially marked with a 'golden spike' in 1972, the specific point is bed 20 in the section where fossil graptolites of the species *Monograptus uniformis* first appear in the strata. Just above this, limestone bed 21 contains trilobites belonging to the *Warburgella rugulosa* group, which are indicative of the Lochkovian stage, the earliest stage of the Devonian Period. The idea is that such points should be fixed in perpetuity but there are arguments that the scheme should not be over-rigid.

The base of the Devonian also demarcates the top of the Silurian System, but the base of the Silurian System has been formally marked with a golden spike at Dob's Linn in southern Scotland. Here the boundary is marked by the first appearance of the graptolite species *Parakidograptus acuminatus* and *Akidograptus ascensus* in a continuous succession of marine strata from the underlying Ordovician. It might seem slightly strange that the top and bottom of a system of strata are placed in different countries, but the passage of Earth Time is a global phenomenon. The purpose of a golden spike is to locate and define a level in a section where time and rock coincide.

Over the last 30 years, all but one of the system boundaries (the exception being the base of the Cretaceous System) for post-Cambrian (Phanerozoic)



the Earth and when that happened – should it be taken from when the first mineral materials have survived? It also has to be remembered that when dealing with radiometric dates derived from rocks that are billions of years old there are significant error bars on each measure that amount to 10 million years or more.

However, the youngest Neoproterozoic Era (one of three divisions of the Proterozoic) includes as its youngest system the Ediacaran with a base dated at 630 million years ago. This has a GSSP located at the base of the Marinoan cap carbonate in the Enorama Section of the Flinders Ranges, South Australia. So here the boundary has been selected on an event basis, namely the end of the Marinoan glaciation. There is hope that eventually these Precambrian GSSAs can be replaced by GSSPs as the stratigraphy of this huge chunk of Earth Time becomes better understood.

As we have seen, a constant problem with the understanding of Earth Time, the timing, duration and rates of its processes, is the thorny question of the resolution of dates and the estimation of uncertainties related to them. In recent years, much of the debate over mass extinction events and their causes has focused on the difficulty of recognising 'instantaneous' or even short-term events in the geological record.

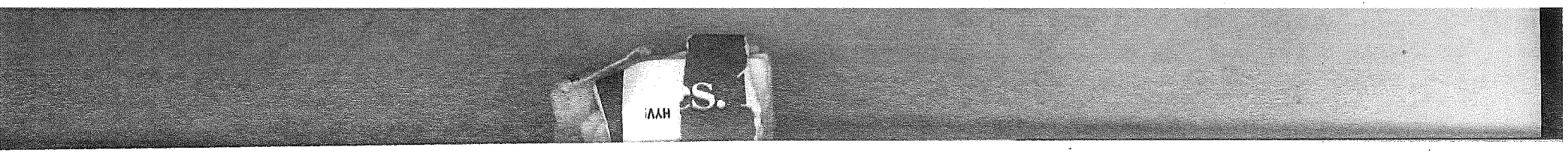
For instance, around 55 million years ago the end of Palaeocene times and the boundary with the overlying Eocene was marked by an extinction event. There was a significant turnover in the newly emerging land mammals and ocean-dwelling micro-organisms. The rock strata from both land and sea environments of deposition record anomalous carbon isotope values across the boundary. Although the anomaly is only measured in a few parts per thousand, nevertheless it was a global event and must represent a release of somewhere between 1200 and 2000 gigatonnes of carbon into the atmosphere. The nature of the event and its global distribution suggested that at least its initiation was probably 'instantaneous'; the question was how long did it last?

Analysis of sediment cores from the deep ocean floor revealed cycles of deposition that can be linked to 19,000- and 23,000-year astronomical precession cycles. By relating the cycles to the carbon 'excursion' (or 'spike', as it is called), it became clear that the spike happened over a very short period of time (geologically speaking).

Recent research suggests that this large-scale event happened in a rapid single pulse that lasted no more than a few thousand years – a truly catastrophic event by anyone's standard. Such a conclusion can only be reached thanks to an accurate timescale. It then took another 120,000 years for the global carbon cycle to recover. The carbon excursion coincides with climate and faunal changes and has been linked to massive releases of methane hydrate into ocean waters from deep within ocean floor sediments (at least 300 m deep) where it is stored in a solid crystalline state. An estimated 14,000 gigatonnes of carbon are still locked up as hydrate in ocean floor sediments and, if quickly released, would have a severe impact on today's carbon reservoir of 42,000 tonnes.

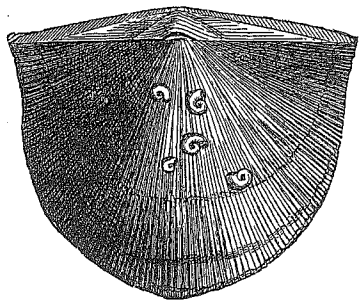
While such resolution of Earth Time is remarkable for the 'deep' past, it is inadequate for the more recent past where dating can still be a real headache for scientists. The recent discovery of the extraordinary 'dwarfed' human species *Homo floresiensis* in Indonesia is a good example. The skeletal remains were found in cave deposits, which are often notoriously difficult to date accurately by any method. Samples of charcoal associated with the bones have been radiocarbon dated at around 18,000 years ago and other dating measures on the surrounding sediment indicate an age of around 38,000 years ago. Fossil remains of the extinct and also dwarfed elephant relative *Stegodon* are associated with the human-related bones. And independent evidence shows that *Stegodon* died out about 12,000 years ago. Consequently, all that can be said so far is that the little *Homo floresiensis* people lived from before 38,000 years ago to at least 18,000 years ago.

Over the last 200 years, much has been achieved in the building of the outlines of the Earth Time calendar and much more will be achieved. But it is important to remember that the construct of Earth Time and its divisions have been fabricated by humans. Uniquely, as far as we know, we are the only life forms to care about the past, whether it is the historic or prehistoric past of Earth Time. Our investigation of the past seems to be part of our continuing effort to understand ourselves and where we have come from. Our forebears felt the strong pull of the deep past and could not resist the temptation to investigate. The new science of geology provided them with the tools and methods to make the journey, however difficult it proved. The revelations of the antiquity of Earth Time and life are fascinating but often prove very uncomfortable for some.



The *terra incognita* of the depths of pre-Cambrian Earth Time, some 4 billion years' worth, are still largely unknown and present a wonderful challenge for future generations of those prepared to voyage into the remotest regions of Earth Time. Fortunately, unlike so many of the pioneers, you no longer have to be a wealthy gentleman amateur or clergyman to pursue the investigation of Earth Time – the future challenge is open to all. Good hunting.

Summaries of ratified GSSPs with locality maps and sections are to be found on the International Commission on Stratigraphy's (ICS's) website (http://www.stratigraphy.org). Details of the state of play with regard to the Quaternary and its subdivision can be found through the website of the International Union for Quaternary Research (INQUA) Stratigraphy and Chronology Commission (SACCOM; http://www.inqua.tcd.ie) and that of the Quaternary Palaeoenvironments Group, Godwin Institute for Quaternary Research, University of Cambridge, UK (http://www-qpg.geog.cam.ac.uk).



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ELEMENTARY SCHOOLS

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GRADES I-VIII

1936

CHARLES W. TAYLOR
State Superintendent of Public Instruction

3. Reporting on what has been accomplished in the class project.
4. Announcing plans for the next club meeting.
5. Making announcements on the refreshments needed for a picnic or party.
6. Giving reports on the inspection of desks, rooms, children's hands, for cleanliness.
7. Reporting how children can be good school citizens.
8. Reporting how children can be good neighborhood citizens.
9. Reporting how children can help to keep streets and sidewalks clean.
10. Announcing safety plans for the school.
11. Giving directions for playing a game.
12. Observing and reporting facts in regard to weather, plant growth, etc.

V. Picture Study

A. Specific Aims
1. To enjoy the picture and appreciate it.
2. To notice pictures in homes and public buildings.
3. To begin what will develop into a lasting interest in pictures.
4. To want a few small copies of good pictures.
5. To get a feeling for color.

B. Suggested Activities
1. Noticing light and shadow of picture.
2. Noticing balance.
3. Noticing high point of interest.
4. Noticing colors used and color combinations.
5. Finding out interesting facts about artist (in some cases).
6. Finding and enjoying other pictures by same artist.
7. Finding and enjoying other pictures on same subject.
8. Telling how the picture makes you feel and what you like about it.
9. Working toward securing copies of some beautiful pictures for one's self.

C. Suggested Pictures for Grades 3 and 4:[24]

"Pilgrims Going to Church," Boughton
"The Holland Flower Girl," or
"A Holland Morning," Hitchcock
"Holy Night," Correggio
"The Balloon," Dupre
"The Horse Fair," Bonheur
"Return to the Farm," Troyon
"The Gleaners," Millet
"The Spinner," Moes
"Itinerant Candy Vendor," Blum
"Play Days in Holland," Charlet
"Return of the Mayflower," Boughton
"Deer in the Forest, Twilight," Bonheur
"Fog Warning," Homer

WRITTEN ENGLISH

I. Letter Writing

A. Specific Aims To Be Attained in Letter Writing
1. To write independently three or four clear related sentences.

[24] Selected by Chairman of Curriculum Revision.

2. To keep a margin and indent a paragraph.
3. To use and punctuate correctly the statement, question and exclamation.
4. To use capitals correctly for names of people, towns, states, days of the week, months, beginning of sentences, important words in titles, and first word in a line of poetry.

B. Suggested Activities
1. Writing letters to pupils who are ill.
2. Writing letters to friends who have moved away.
3. Writing business letters to firms asking for material to use in connection with school work.
4. Writing letters to pupils of other schools.
5. Writing invitations for Patrons' Day.
6. Writing letters thanking those who have given you help.

C. Mechanics in Letter Writing To Be Stressed
1. Heading including the person's name.
2. Salutations for business letters and for friendly letters.
3. Avoid formal sentences or phrases.
4. Correct spelling of words, such as "friends" and "sincerely."

II. Creative Writing

A. Specific Aims in Teaching Creative Writing
1. To preserve natural graphic speech of children.
2. To turn creative instincts toward the field of language.
3. To give expression to child's fresh outlook on life.
4. To give an expression to child's play spirit.
5. To preserve in written form child's best creative work.

B. Suggested Activities
1. Making up an original play to be given before an audience of parents or at a club meeting.
2. Rewriting a story as a play.
3. Writing rhymes and verses for an individual booklet.
4. Writing rhymes and verses for a room book of verse.
5. Putting a story into form to be used for a puppet show.
6. Writing original stories.
7. Writing original endings for stories.
8. Rewriting a story for a moving picture.
9. Writing riddles.
10. Helping to prepare a class newspaper.
11. Making a record book of the class activities of the year.
12. Writing a class booklet, each child contributing a part.

IMPROVING YOUR SPEECH[25]

I. Emphasis on clear enunciation.
II. Use of correct forms suggested for Grades 1 and 2.
First semester
III. Emphasis on use of:
Come, came; give, gave; can, may; saw, seen; himself; this, that.
Second semester
IV. Emphasis on use of:
Learn, teach; our; good; you and I; you and me; him and me.

[25] Contributed by Miss Mary L. Hileman, State Teachers College, Peru, Nebraska.

a. What has tended to make this a period of "unrest"?
   (1) Make a list of the acts already studied that you consider in the interests of the common people rather than large property owners and corporations.
   (2) Show just how these laws have helped you or your folks.
   (3) Those in the interests of labor especially.

b. Conservation movement
   (1) Meaning.
   (2) Growth of the idea.
   (3) Theodore Roosevelt.
   (4) Forest reserves.
   (5) Irrigation projects.
   (6) Oil and mineral reservations and restrictions.
   (7) Meeting of the governors, 1908.
   (8) Rural life commission.
   (9) Why all this activity?
   (10) Has anything been accomplished?

c. Pure Food laws, 1906
   (1) Meaning.
   (2) Need for.
   (3) Whose business is it?
   (4) Various acts.
   (5) Any other legislation along this line.

d. Trusts, 1905 on
   (1) What wrongs do any of them do?
   (2) What prosecutions for their wrongdoing?
   (3) What has been done to control them?
   (4) To break them up?
   (5) What was the life insurance investigation, 1905?
   (6) What done about it?
   (7) Clayton Anti-Trust Act, 1914.
   (8) Federal Trade Commission.

e. List of new states admitted since 1876
   (1) How is a state admitted?
   (2) How many now in the Union?
   (3) What chance for any more?

f. Arbitration treaties
   (1) What did Taft have to do with these?
   (2) Bryan?
   (3) Why so much effort along this line?
   (4) Have they accomplished anything?
   (5) Would they have prevented the World War?
   (6) Are they worth-while?

g. Tariff
   (1) Why was the Payne-Aldrich bill, 1909, introduced?
   (2) The Underwood bill, 1913.
   (3) Wherein are they different?
   (4) What is a tariff commission?
   (5) Any new tariff laws since 1913?

h. Postal changes
   (1) Parcel post.
   (2) Postal savings banks.
   (3) Rural free delivery.
   (4) Rural road legislation.
   (5) What is the nature and purpose of each of these?
   (6) Their value?

i. Third parties and governmental reforms:

(1) What are "third parties"? (2) Who is helped by them? (3) Who injured? (4) What and why was the Populist party? (5) Of what effect? (6) Progressive party? (7) What is Socialism? (8) Do we use any socialistic ideas in our affairs today? (9) What is meant by Initiative, Referendum, and Recall? (10) Where are they used? (11) Of what effect? (12) Where did we get the idea? (13) What changes in city governments have been going on? (14) What is the Commissioner System? (15) Wherein is city government a big problem? (16) What is the Budget System? (17) Where used? (18) Of what value?

j. Financial affairs
   (1) Importance of credit.
   (2) Federal Reserve Banks, 1913
      (a) Why was a new banking bill needed?
      (b) How many such banks?
      (c) Why not just one?
      (d) Who furnishes the capital?
      (e) Who deposits with them?
      (f) How do they affect the rest of the country?
      (g) Why should the government regulate banks any more than shoe stores?
   (2) Federal Farm Loan Act
      (a) Nature of it.
      (b) Why needed?
      (c) How help the farmer?
   (3) Income tax law, 1916
      (a) What is it? Who opposed? Why?

k. Trouble between United States and Mexico
   (1) What was the situation in Mexico?
   (2) Who was to blame?
   (3) What has the United States done about it since 1911?
   (4) How does the matter stand today?
   (5) When we had a Civil War, how did we want other nations to act toward us?
   (6) What would you do if you were a Mexican?

l. Immigration question
   (1) More laws needed.
   (2) From what countries do immigrants come mostly today?
   (3) Has it always been so?
   (4) To what parts of the country do they go today?
   (5) Where is this different?
   (6) Why?
   (7) Of what benefit are they to this country?
   (8) Of what injury?
   (9) What laws have been made to check them?
   (10) How do immigrants become citizens?
   (11) How do they become Americanized?

4. Have children tell all the instances they can think of in which air has taken water.
5. Observing and naming the kinds of clouds in the sky on different days.
6. Keeping a simple weather record for each day, giving the date, temperature (hot, warm, cool, or cold), wind direction (gentle or brisk), and precipitation (rain or snow).
7. Studying snow crystals and frost patterns on the windowpanes, structure of hail stones, etc.

III. Standards of Attainment

A. To begin to understand why air moves.
B. To know that the sidewise movement, not the up and down movement, is what we call wind.
C. To know that air evaporates water.
D. To understand that, when the air is cooled, some of its water load becomes visible and is dropped. This is the cause of rain, clouds, snow, etc.
E. To be interested in getting the weather forecast from newspapers and radio.
F. To be able to identify the four kinds of clouds when they are seen.

UNIT SEVEN: WHAT BECOMES OF THE RAIN

Time Allotment: 1 Week

I. Specific Aim: To interest the children in observing the work of running water and to help them to begin to understand how the work of running water is changing the surface of the land on which we live.

II. Teaching Procedures

A. Finding the Starting Point

1. Some of the water that falls as rain runs off and flows downhill to lower places where there are creeks and rivers. How does "run off" find the way to go? Did you ever see the water running down the road after a rain? What did it do to the road? What does the rain water look like as it runs down a steep place in the road? What is it carrying? Does "run off" carry more mud and sand when it is going fast or when it is going slowly? Where does the water go after it gets to the foot of the hill? Does "run off" carry its load all of the way? If "run off" is picking up and carrying off mud and sand from the hillside and dropping it on the more level places, what is happening to the hills? "Run off" is very busy making over the surface of the earth on which we live. For ages it has been carrying away material, bit by bit, and storing it in some lower place. So nearly all our hills and valleys are formed by "run off" because it has removed more material from some places than from others.

B. Activities

1. Visiting a stream and observing the following: source, slope, divide, tributary, fall, delta, drainage basin. Find miniature land and water forms here, such as, peninsula, cape, bay,

island. Select a place along the stream where there are several tributaries not far apart.
2. Finding places where soil erosion has occurred and showing how it affects the farmers' fields. Interview the fathers to find out how the eroding of our soil can be prevented.
3. Modeling in sand a stream with its tributaries and their divides.

III. Standards of Attainment

A. To know that some of the rain soaks into the ground and feeds wells and springs.
B. To know that some of the rain runs along the surface as slope wash until it cuts a channel for itself, leading to a larger stream bed. It is this movement of water that is constantly cutting down the uplands and carrying the material away. This is known as erosion.
C. To know that some of the rain disappears into the air and is carried away. We call this evaporation.

UNIT EIGHT: A GOOD FARMSTEAD AND ITS EQUIPMENT

Time Allotment: 2 Weeks

I. Specific Aim

To develop an interest in the everyday events of life on the farm.

II. Teaching Procedures and Content

A. Topics for Discussion

1. How the farmer takes care of his live stock.
2. How the farmer houses and feeds cattle, hogs, sheep, and chickens.
3. Machinery used on the farm and its uses.
4. Crops the farmer raises in your neighborhood.
5. Planting, cultivating, and harvesting each crop raised in your neighborhood.

B. Class Activities

1. Representing a model farmstead on the sand table or in the schoolyard.
2. Dividing the area into fields (crops and hay land) and deciding what should be planted in each. Selecting a good place for the pasture, orchards, and vegetable gardens.
3. Locating a dwelling house, barns, granaries, cribs, silo, garage, etc., and stock and poultry yards.
4. Making a chart showing pictures of implements with a brief story about each. (Use pictures and descriptions from implement catalogs and farm magazines).

C. Individual Activities

1. Mapping the home farm, locating the different plots, woodland, wasteland, idle land, corn, small grain, hay, pasture, and orchards. On the map, the following symbols may be used: heavy dotted lines for farm boundaries; solid lines for field divisions and, for locating creeks, a line curved to follow their course. Use red for the right of way for railroads, yellow for crop land, blue for hay and pasture, green for woodland,

"So far as the history of education in the United States reveals, this nation has been committed more or less determinedly to the indirect teaching of morals through our subject matter courses, our classroom activities—intra-curricular and extra-curricular—and through the necessary regimen of classroom or school management of policies.

"There is no doubt but that the indirect method of instruction in morals and character has its advantages. Such a method can be used and has been used most effectively in the instructional process. It permits most certainly of doing what has been so aptly expressed in the words, 'striking when the iron is hot.' It permits of using the situation of the moment, logically and psychologically, for 'driving home' some valuable lessons in the matter of right conduct and behavior, right social relationships, respect for one's home and country, one's laws and customs, and respect for the dignity of labor.

"Such a method does not become a 'preachment.' It is not readily thought of as 'moralizing.' It does not thrust itself into strange places at sundry times. . . . . .

"The direct method like the indirect, has its advantages as well as its weaknesses. Certainly it more than offsets the haphazard, unorganized, unsystematized and 'accidental' nature of the indirect method for it does provide possibilities for properly organizing a program on the basis of certain 'traits' or 'modes of behavior' or 'standards of conduct.' Knowing these and providing a category in which they will or might be expected to appear, we can be more assured of their being properly treated in the various situations that arise during the year. Various traits will then find opportunity of treatment in a more definite and certain manner. The direct method also more certainly guarantees that there will be a large opportunity for practice in favorable situations."[125]

School clubs should provide for practice in favorable situations. Teachers should have definite plans for developing desirable character traits. Here again, there might be a discussion as to just what are the desirable traits or qualities which we should develop. "At your first club meeting discuss the qualities of a good knight. These are some of the qualities of a good knight:

courtesy	honesty	unselfishness	sportsmanship
responsibility	industry	courage	justice
promptness	cheerfulness	cooperation	service
kindness	good health	self-control	thrift
obedience to	loyalty	friendliness	neatness
authority	independence	sympathy	reverence."[126]

The term "Knighthood" has an appeal in that it offers an opening in the land of adventures. The various activities assumed by the club and the individual members are to them their "knightly adventures." "Knighthood" represents an ideal, that of service. Every child is encouraged to overcome his bad habits, replacing these with good habits. Ways of encouraging these individual improvements are presented at club meetings by the various committees. Commendation is given at the club meeting to individual pupils who form desirable habits. Care must be taken to continue the activities conscientiously after they have become fairly well established as habits.

125 Rosenlof, G. W., Editor's Preface, Bulletin H—"Character Education," by F. M. Gregg for State Department of Public Instruction.
126 Hoben, Alice M., "Knights Old and New," D. Appleton and Company, New York.

In the club plan the strong incentive to do right is the approval of the social gallery which through the club, includes the school, home and community. "Group approval and disapproval are among the most important determinates of conduct. In primitive societies, social control is largely exercised through group opinion. In a modern democracy, great issues can be forced aright by adequate public opinion."[127]

"American school men, in discussing the principles of education some fifteen years ago, placed the emphasis on (a) health, (b) vocational training, (c) social cooperation, (d) worthy use of leisure, (e) worthy home membership, (f) ethical character, (g) command of the fundamental processes. Until that time education had meant chiefly the command of the fundamental processes, such as reading, writing, and arithmetic. President Charles W. Eliot was a leader in this new emphasis upon the social phases of education. From that day we have worked toward the **education of the whole child.** We are more concerned today about the child's social attitudes, his emotions and conduct. We are less ardent to inflict upon him superficial indoctrinations. We want socialized citizens and not mere adding machines and phonograph records."[128]

"We must work through the individual, not to shape him, but perchance to influence **his shaping of himself!** . . . .

"We, and all other experiences from the outside, may influence him—but only as and in the way in which **he rates and adjudges and values** our part.

"It is instantly obvious that the relations between influencer and influencee are crucial!

"This conception of working through the person to be influenced is more deeply revolutionary than one realizes at first. The emphasis for centuries has been on curriculum, on method, on teaching—the spot-light of science today reveals the learner as the important factor! The processes of teaching may well be polished, but the processes of learning are yet more vital. What is in the mind of the learner?

"In character learning, as in all learning, we must work through the individual's own activity and through **his** processes and through his scale of values."[129]

As educators we are given a large responsibility in influencing the character of our boys and girls. Admitting that we cannot complete the

127 Hurt, Dr. H. W., "The Influencing of Character," The College Blue Book Company.
128 Wyland, Ray O., Ph.D., "Scouting in the Schools," Bureau of Publications, Teachers College, Columbia University, New York City.
129 Hurt, Dr. H. W., "The Influencing of Character," The College Blue Book Company, Hollywood, Florida.

(h) What has Rule G meant to the people of the United States?

(i) What are the requisites of a good conductor, fireman, engineer, etc.?

(j) Describe particularly the qualities needed by a successful engineer (i. e., a good vision, steady nerve, quickness of nerve reaction, alertness).

(k) What are the effects of alcohol upon each of these qualities?

2. **Suggestions for Correlating Other Curriculum Subjects**

Correlate with the study of history and physiology.

III. Standards of Attainment for Eighth Grade Pupils

A. What fermentation is.
B. The ability to describe the relationship between fermentation and alcoholic liquors.
C. The knowledge of what a narcotic is.
D. The recognition of the fact that both alcohol and tobacco are narcotics.
E. The recognition of the fact that alcohol is not a stimulant even though it seems to be.
F. Some of the regulations made by different industries concerning the use of alcohol by its employes.
G. That many of the finest athletes have believed it advisable to abstain from alcoholic liquors.
H. That many successful and famous men and women have for their own good abstained from drinking alcohol.
I. Alcohol is friendly to disease.
J. That society is compelled for its own protection to control and make certain regulations concerning the use of various narcotics.
K. That indulgence in narcotics is derogatory to all the health habits one has been learning in school.
L. That the narcotic addict is a burden to society and why.

IV. Glossary

Alcohol—"Ethyl" or "grain" alcohol is a colorless, volatile, inflammable liquid having a characteristic disagreeable odor and burning taste. It is the intoxicating ingredient in fermented and distilled liquors. C_2H_5OH.

Alcoholic Liquors—The more common alcoholic liquors are wine, beer, whisky, brandy, gin, port, stout, and ale.

Beer—A brewed liquor made with malted grain, commonly barley, and flavored with hops. It is also made from wheat, rye, oats, rice, and corn.

Wine—The fermented juice of fruits, usually grapes.

Whisky—A distilled alcoholic liquor made from grain, (rye, wheat, corn, malted barley). Also a similar liquor made from potatoes.

Stimulant—A substance which excites part or all of the cells of the body to greater activity than is usual; an agent that produces a temporary increase of vital activity; that which animates, enlivens.

Narcotic—A substance which tends to depress or deaden the action of all or part of the cells of the body; a drug which, in small doses, relieves pain and produces profound sleep, but in larger doses produces stupor, coma, or convulsions.

Food—A substance which when taken into the body, produces growth or repair of tissues, as well as the production of energy to be used in the ordinary body functions.

"From the scientific point of view, a foodstuff or food may be defined as a substance necessary to the normal composition of the body, as in the case of water and salts, or as a substance which can be acted upon by the tissues of the body in such a way as to yield energy (heat, for example) or to furnish material for the production, repair, or normal activity of living tissue. Moreover, to be a food in the physiological sense, the substance must not directly or indirectly affect injuriously the normal nutritive processes of the tissue."[177]

Poison—Any agent which, introduced into an animal organism, may produce a morbid, noxious, or deadly effect.

Drug—Any substance used medicinally.

Intoxicant—An intoxicating agent, such as alcohol or opium. (Derived from Latin word "toxicum," arrow poison.)

Intoxicate—To make drunk, excite, or stupefy by alcohol or other narcotics.

Intoxicating—Producing or tending to produce intoxication.

Intoxicated—Emotionally wrought-up

Alcoholism—A diseased condition of the system, due to continual use of alcoholic liquors.

Health—Soundness of body, i. e., that condition of a living organism and its various parts and functions which conduces to efficient and prolonged life.

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177 Howell. Textbook of Physiology, 11th edition. p. 757.