Out of the Past

A PLAY, *in two acts, created, and presented in a school assembly, by a ninth grade class, under the direction of* FLORENCE BROOKS MILLER, *Shaker Junior High School, Shaker Heights, Ohio.*

As opportunities presented themselves, historical bits of information were injected into the program of a ninth grade algebra class. Among these were the development of our number system, and the use of mechanical devices, from very early times up to the present, to aid man in keeping track of things as well as to calculate.

It was suggested one day that a dramatization of such information would be interesting and might be used in a school assembly. Several plans were discussed and when one was finally decided upon, the whole class felt that it was a creation of the group. This play is not the work of one person. Suggestions, criticisms, changes, by members of the class, made it what it is. Every member of the class was cast in the play when it was enacted before the school.

The stage set for the second act was rather unusual. The dramatic director of the Shaker Heights Schools, E. Benson Sargent, assisted us immeasurably. What appeared to be a large circular window, with a diameter of ten feet, was in the background. Scrim was stretched across it, making of it a screen upon which pictures were thrown from a stereopticon. The use of lighting made it impossible to see anything back of the screen until the right time for the various events mentioned by the scholar, to appear in the form of a tableau or pantomime. Dimming the table light, which shone upon the scholar and his visitors, the pictures were made visible on the screen. (On plain glass slides pictures were painted which depicted the eight scenes which were appropriate for the tableaux.) Bringing up a bright light back of the screen, the picture faded out and the tableau or pantomime was clearly seen.

OUT OF THE PAST

Act I

Time: The present

Place: A Chinese Restaurant

(A corner of the restaurant is seen. The Cashier's desk is near the door at the left. Two or three tables have people seated at them eating. At a table near the front of the stage are a young man and a lady who are getting ready to leave.

Young man (to waiter): Check please.

Waiter: Yes, sir. (Makes out the bill)

Lady: I enjoyed this very much, Frank.

Young man (helping her on with her coat): I did too, Esther. The food is certainly good here.

(They walk over to the cashier's desk where they see an abacus.)

Young lady: What is this?

Cashier: It is what I do all my calculating upon. It is called an abacus. Have you never seen one before Miss?

Young lady: No, never. I have heard of them. It reminds me of the beads on wires we used to have in the kindergarten.

Cashier: Yes? See, I use it this way. (Working the abacus very fast)

Young man: You get lots of practice I guess.

Cashier: Yes, I do. I learned in China. There these are used everywhere in banks, in counting-houses, stores and so on. Are you interested in such devices, Miss?

Lady: Indeed I am. I have always been curious about calculating machines.

Cashier: There is in this city an old Chinese scholar who has collected and made a study of all manner of instruments used in calculating and recording numbers. I shall be very glad to give you his address. Perhaps you have heard of him. I speak of the Honorable Doctor Kuan Chan.

Lady: No, I have never heard of him.

Young man: I have. Do you think he would give us an audience?

Cashier: Yes. Especially if he knows that you are interested in these things. He craves listeners!

(Writes the address of the Scholar for them.)

Young man: Thank you very much.

(To Esther) I shall phone and make an appointment and if the worthy doctor will see us we shall go there tomorrow.

(They go out and the curtain is drawn.)

Act II

Time: The following day.

Place: Home of the Honorable Doctor Kuan Chan.

(The old scholar is seated in an easy chair reading a large book. At his feet sits his small grandson. The door bell rings. The child goes to the door.)

Young man: Good afternoon, my young man. The honorable Dr. Kuan Chan is expecting us. Miss Grant, and Mr. Stapleton.

Boy: Oh! Come in. My honorable grandpapa is right in this room awaiting your arrival. (They enter.) Honorable Grandpapa. Here are guests. Miss Grant and Mr. Stapleton.

Scholar: Come right in. Lee, draw up comfortable chairs. Won't you lay off your wraps? I have been anticipating with pleasure your visit since our conversation over the phone, Mr. Stapleton. So this is the young lady who is also interested in mechanical devices used for calculation.

Lady: Yes, Dr. Kuan Chan. I am looking forward to hearing much of interest this afternoon.

Scholar: Well, there is much to tell and to show you. I have gathered some of the old relics from my collection and we shall start with these pebbles as they were probably used earlier than any other thing, as an aid in counting.

Lady: Pebbles!

Scholar: Yes. (Picture of a jungle with a clearing appears on the screen) Primitive man evidently counted on his fingers, as is very natural for us to do today. It is easy to keep track of a small number of things in that way. But when, say, twenty or any number over ten is counted, confusion might creep in, so pebbles or shells were used.

(Picture fades away and behind the screen is seen the acting out of the story told by the scholar)

Let us imagine a group of captives, taken by a primitive tribe. The head of the tribe wants to know how many captives there are. As each captive passes the chief, one of the tribe drops a pebble on the ground. When ten are so counted or in other words when he has counted all his fingers, the pebbles are gathered up and one stone is placed to one side to represent ten. This continues until a heap of ten pebbles each indicating ten is piled up. Then one is placed in another position to represent one hundred.

(Lights go off back of the screen and we no longer see the pantomime.)

Young man: Dr. Kuan Chan, I have heard that the Latin word for pebbles was calculi and that the name of a branch of mathematics the Calculus, came from it.

Scholar: That is more than likely.

Lady: Wouldn't our verb "to calculate" come from "calculi" too? Just think how much we owe to the pebble!

Scholar: You are right, Miss Grant. (Turning to his grandson) Lee, bring me the knotted cords.

Boy: Here they are Grandpapa. (Hands him the knotted cords.)

Scholar: Knots on cords have a long and varied history. A Chinese philosopher in the sixth century B.C. referring to the earlier use of the knotted cords said, "Let the people return to knotted cords and use them." In 1872 in taking the census for India, the Santals in the wilder parts of India used knots on four colors of cords, the black for the adult men, the red for the women, the yellow for the girls and the white for the boys.

Young man: I have read that the Zuni

Indians had a system of knot numerals. A medium knot indicated 5, and this with a small knot before it indicated $5-1$, whereas if the knot came after the medium sized one, the number was $5+1$. A large knot indicated 10, and a small knot was used either before or after it to indicate 9 or 11 respectively.

Scholar: Yes, see I have a similar kind here. (Showing such a grouping of knots)

Lady: That reminds me of the Roman Numerals. If I is placed before V it stands for four, and if after V it means six.

Scholar: Yes, Miss Grant, it is the same idea. The knotted cords reached their more elaborate forms among the Peruvians. The different colors, the sizes of the knots, the distance between the knots, all had some significance.

Young man: The surveyor's chain is a modern example of the knotted cords, isn't it?

Scholar: Yes and the knotted cords are found in various forms of religious regalia and most pronounced in the rosary upon which prayers are counted by Catholic Christians.

(A scene showing the bridge over the Ister River is seen on the screen as the Scholar continues.)

The famous historian, Herodotus, who lived in the fifth-century B.C. tells us that the King of Persia handed the Ionians a thong with 60 knots on it, as a calendar for two months. He also tells us that Darius, who also lived in the fifth century B.C. bade the Ionians to guard the floating bridge that spanned the Ister.

(Picture fades away and the acting back of the screen is seen as the Scholar tells the story.)

He tied sixty knots in a thong, saying, "Men of Ionia, do keep this thong and do as I say. So soon as ye shall have seen me go forward against the Scythians, from that time begin and untie a knot each day; and if within this time I am not here, and ye find that the days marked by the knots have passed by, then sail away to your own lands.

(Lights go off back of the screen and we no longer see the acting.)

Lady: How very interesting!

Young man: And what are these sticks? (Lee brings them over)

Scholar: Those are tally sticks. You see they are in pairs. (They examine the tally sticks.)

Lady: They have notches.

Scholar: The idea of keeping records on a stick is very ancient. On a bas relief on the Temple of Seti, 1350 B.C., at Abydos, Thot is represented as indicating by means of notches on a long frond of palm the duration of the reign of Pharaoh as decreed by the gods.

Lady: 1350 B.C.!

Scholar: In the Middle Ages the tally formed the standard means of keeping accounts. The notches were cut before it was split so as to allow each party to have the same record, whence the expression "our accounts tally."

Lady (examining one closely): The twentieth notch is larger and deeper than the others.

Scholar: Yes and from that fact we get the name "score" for twenty.

Lady: That's right, score means cut, doesn't it? Because the twentieth cut or score is the largest it is called the score. How interesting!

(On the screen is shown a bank interior in England, in early times.)

Scholar: If a man lent money to someone, the amount was cut on a tally stick by notches. Identification marking and the date were also cut on it. This was then split, the borrower keeping the foil and the lender the stock. That is the origin of the name "stock" in "stockholder" of a company.

Young man: Is that where the term "bank stock" comes from? I always wondered about that.

(The acting back of the screen shows men entering the bank handing over money and getting tally sticks.)

Scholar: The tally was used all over

Europe as early as the 13th and 14th centuries.

Lady: Though the tally sticks are not common today, expressions derived from them are. We speak of the score of a game, a Bridge score pad, and accounts tallying.

Young man: Yes. And don't forget the Bank stock.

Lady: Some of us today would like to forget that we ever had bank stock! (They all laugh.)

Young man: What about that board over there? What was it used for?

Scholar: Well, that comes next. Bring it here, Lee. An early method of writing down numbers in a systematic way was the use of the dust board. Parallel lines were drawn by the finger in the dust or sand strewn on the board. Upon the lines, pebbles were laid. When the tenth pebble was about to be placed, it was laid on the second line and the nine already placed were removed. Continuing to count, pebbles were again placed upon the first line, the tenth one being placed on the second line with the first ten.

Lady: Writing paper was unknown then was it not?

Scholar: Yes. Papyrus was used as writing material about 2000 B.C. and was used in Italy in the 12th century. For centuries all writing materials were very expensive.

Lady: It was a common custom to write upon sand wasn't it in early days? We read in the Bible how Jesus wrote on the sand.

(While this conversation is going on there is a scene suggesting Palestine and the acting back of the screen will then be seen. An old mathematician studying a geometric figure drawn on the sand.)

Young man: I have seen pictures of ancient mathematicians, Archimedes, for example, studying a geometric figure drawn on the sand of a shore.

Scholar: Yes. The dust or sand give the counting board and other forms developed from it the name "abacus." An old Semitic word, abaq, means sand.

Lady: That is what the cashier in the restaurant called his calculating frame yesterday, an abacus.

Scholar: The dust abacus finally gave place to a ruled table upon which disks or counters took the place of pebbles. It is as interesting as a game, to add, substract, multiply, and divide on the counting board. Spaces as well as lines had a distinct decimal value. There could not be more than four disks on a line, nor more than one in a space. If there should be five on a line one is carried to the next space in their stead.

Lady: Do you suppose that is why we use the expression "carry" in addition?

Scholar: Yes. And in subtraction, using the counting board, disks are actually borrowed when needed.

Young man: Those crosses marking every third line are only to help in the reading of the number as do the commas which are used in writing our large numbers, I suppose?

Scholar: Exactly. This board was commonly called by merchants a counter.

Lady: Why! We call the long table over which goods are bought and sold in a store, a counter.

Scholar: Yes. We can easily understand how that name came into use now can't we?

(The scene on the screen shows a business street in old London, and the acting, seen back of the screen shows the counter used in a London Counting House.)

The English Exchequer got its name from the checkered board or counter.

Young man: Then our word "check" can be traced to this counting board too?

Young man: The abacus used by the Chinese Cashier is very much like the counting board. Instead of lines there are wires and instead of counters there are the beads strung on the wires.

(Scene on the screen, a street in China. Back of the screen is enacted a scene in a counting house in China where very rapid work is being done on an abacus.)

Scholar: This form of the abacus is still

used commonly in China, Japan, Russia and parts of Arabia. The computer works very rapidly as an expert typist or pianist and secures his results in adding, subtracting, multiplying, and dividing much more quickly than can be done by our common methods. (Scene closes)

When people began to write numbers without drawing lines to keep them in place the difficulty of position showed up and the zero came into use.

Lady: That gives me a new idea of the zero. It is a sort of stopper, isn't it?

Scholar: Yes. It keeps the digits in their right places.

Lady: Doesn't digit mean finger?

Scholar: Yes. We see again a trace of counting on fingers, don't we? The black-board and chalk, slate and slate-pencil, paper and pencil, or pen have taken the place of the counting board and like forms.

(Scene on the screen—an old-time school room. This fades away and back of the screen is enacted a scene in an old time school room with pupils working at the black-board, on slates, etc. The teacher is showing a class how to use Napier's rods as the Scholar is telling about them)

Young man: What are those sticks, Dr. Kuan Chan? (Lee brings them over.)

Scholar: These sticks are called Napier's rods. John Napier, a Scotchman, who lived in the 16th century invented this device for multiplying any two numbers together without having to know the multiplication combinations. By placing the sticks so that the multiplicand is seen along the top, so, and the multiplier is seen on this index at the side, so, the product is found on this line beside the multiplier, here. It entails a little bit of adding but no multiplying.

Lady: How very clever! Let me see if I can do it. Frank, you write down what I say. (She places the sticks together and works a problem. Frank then multiplies the numbers our way and finds the answer to be correct.) Scene closes.

Young man: We use commonly so many shortcuts and time-saving devices in our problem solving, without realizing how much they really mean to us.

(On the screen is shown a modern business office with desks chairs, etc. Then as that fades out we see a very busy office with graphs on the walls, interest tables, also. Adding machines, typewriters, slide rule, mechanical calculus etc.)

Young man: When we think of the tables and graphs made out so that all we need do is to learn how to read them the comptometer that performs all manner of calculations for us when we touch the right buttons, the slide rule that aids us in estimating, computing and checking results, the Integraph that aids engineers in the solution of problems involving the Calculus, we are impressed with the inventiveness of man.

Lady: And also, how dependent upon the primitive devices, the most intricate modern inventions are. We are indebted to you Dr. Kuan Chan, for teaching us so much of the history of calculation.

Scholar: It has been a great pleasure to me to have this visit with you who have like interests with me. May I hope for future visits from you as we have touched only a few of the many historical developments dependent upon mathematics. (They put on their wraps)

Lady: We shall plan to come back soon Dr. Kuan Chan. Good-bye.

Young man: Good-bye, Dr. Kuan Chan.

(Curtain)

"The Mathematics Teacher" wishes all of its subscribers a Merry Christmas and a Happy New Year!