

## Chapter 6

### MISCELLANEOUS NUMBER BASES.

#### THE QUINARY SYSTEM.

The origin of the quinary mode of counting has been discussed with some fulness in a preceding chapter, and upon that question but little more need be said. It is the first of the natural systems. When the savage has finished his count of the fingers of a single hand, he has reached this natural number base. At this point he ceases to use simple numbers, and begins the process of compounding. By some one of the numerous methods illustrated in earlier chapters, he passes from 5 to 10, using here the fingers of his second hand. He now has two fives; and, just as we say "twenty," *i.e.* two tens, he says "two hands," "the second hand finished," "all the fingers," "the fingers of both hands," "all the fingers come to an end," or, much more rarely, "one man." That is, he is, in one of the many ways at his command, saying "two fives." At 15 he has "three hands" or "one foot"; and at 20 he pauses with "four hands," "hands and feet," "both feet," "all the fingers of hands and feet," "hands and feet finished," or, more probably, "one man." All these modes of expression are strictly natural, and all have been found in the number scales which were, and in many cases still are, in daily use among the uncivilized races of mankind.

In its structure the quinary is the simplest, the most primitive, of the natural systems. Its base is almost always expressed by a word meaning "hand," or by some equivalent circumlocution, and its digital origin is usually traced without difficulty. A consistent formation would require the expression of 10 by some phrase meaning "two fives," 15 by "three fives," etc. Such a scale is the one obtained from the Betoya language, already mentioned in Chapter III., where the formation of the numerals is purely quinary, as the following indicate:

5. teente = 1 hand.

10. cayaente, or caya huena = 2 hands.

15. toazumba-ente = 3 hands.

20. caesa-ente = 4 hands.

The same formation appears, with greater or less distinctness, in many of the quinary scales already quoted, and in many more of which mention might be made. Collecting the significant numerals from a few such scales, and tabulating them for the sake of convenience of comparison, we see this point clearly illustrated by the following:

TAMANAC.

5. amnaitone = 1 hand.

10. amna atse ponare = 2 hands.

ARAWAK, GUIANA.

5. abba tekkabe = 1 hand.

10. biamantekabe = 2 hands.

JIVIRO.

5. alacoetegladu = 1 hand.

10. catoegladu = 2 hands.

NIAM NIAM

5. biswe

10. bauwe = 2d 5.

NENGONES

5. se dono = the end (of the fingers of 1 hand).

10. rewe tubenine = 2 series (of fingers).

SESAKE.

5. lima = hand.

10. dua lima = 2 hands.

AMBRYM.

5. lim = hand.

10. ra-lim = 2 hands.

PAMA.

5. e-lime = hand.

10. ha-lua-lim = the 2 hands.

DINKA.

5. wdyets.

10. wtyer, or wtyar =  $5 \times 2$ .

BARI

5. kanat

10. puoek =  $5 + 5$ ?

KANURI

5. ugu.

10. megu =  $2 \times 5$ .

RIO NORTE AND SAN ANTONIO.

5. juyopamauj.

10. juyopamauj ajte =  $5 \times 2$ .

API.

5. lima.

10. lua-lima =  $2 \times 5$ .

ERROMANGO

5. suku-rim.

10. nduru-lim =  $2 \times 5$ .

TLINGIT, BRITISH COLUMBIA.

5. kedjin (from djin = hand).

10. djinkat = both hands?

Thus far the quinary formation is simple and regular; and in view of the evidence with which these and similar illustrations furnish us, it is most surprising to find an eminent authority making the unequivocal statement that the number 10 is nowhere expressed by 2 fives— that all tribes which begin their count on a quinary base express 10 by a simple word. It is a fact, as will be fully illustrated in the following pages, that quinary number systems, when extended, usually merge into either the decimal or the vigesimal. The result is, of course, a compound of two, and sometimes of three, systems in one scale. A pure quinary or vigesimal number system is exceedingly rare; but quinary scales certainly do exist in which, as far as we possess the numerals, no trace of any other influence appears. It is also to be noticed that some tribes, like the Eskimos of Point Barrow, though their systems may properly be classed as mixed systems, exhibit a decided preference for 5 as a base, and in counting objects, divided into groups of 5, obtaining the sum in this way.

But the savage, after counting up to 10, often finds himself unconsciously impelled to depart from his strict reckoning by

fives, and to assume a new basis of reference. Take, for example, the Zuni system, in which the first 2 fives are:

5. oepte = the notched off.

10. astem'thla = all the fingers.

It will be noticed that the Zuni does not say "two hands," or "the fingers of both hands," but simply "all the fingers." The 5 is no longer prominent, but instead the mere notion of one entire count of the fingers has taken its place. The division of the fingers into two sets of five each is still in his mind, but it is no longer the leading idea. As the count proceeds further, the quinary base may be retained, or it may be supplanted by a decimal or a vigesimal base. How readily the one or the other may predominate is seen by a glance at the following numerals:

#### GALIBI.

5. atoneigne oietonai = 1 hand.

10. oia batoue = the other hand.

20. poupoupatoret oupoume = feet and hands.

40. opoupoume = twice the feet and hands.

#### GUARANI.

5. ace popetei = 1 hand.

10. ace pomocoi = 2 hands.

20. acepo acepiabe = hands and feet.

#### FATE.

5. lima = hand.

10. relima = 2 hands.

20. relima rua =  $(2 \times 5) \times 2$ .

### KIRIRI

5. mibika misa = 1 hand.

10. mikriba misa sai = both hands.

20. mikriba nusa ideko ibi sai = both hands together with the feet.

### ZAMUCO

5. tsuena yimana-ite = ended 1 hand.

10. tsuena yimana-die = ended both hands.

20. tsuena yiri-die = ended both feet.

### PIKUMBUL

5. mulanbu.

10. bularin murra = belonging to the two hands.

15. mulanba dinna = 5 toes added on (to the 10 fingers).

20. bularin dinna = belonging to the 2 feet.

### YARUROS.

5. kani-iktsi-mo = 1 hand alone.

10. yowa-iktsi-bo = all the hands.

15. kani-tao-mo = 1 foot alone.

20. kani-pume = 1 man.

By the time 20 is reached the savage has probably allowed his conception of any aggregate to be so far modified that this number

does not present itself to his mind as 4 fives. It may find expression in some phraseology such as the Kiriris employ— “both hands together with the feet” –or in the shorter “ended both feet” of the Zamucos, in which case we may presume that he is conscious that his count has been completed by means of the four sets of fives which are furnished by his hands and feet. But it is at least equally probable that he instinctively divides his total into 2 tens, and thus passes unconsciously from the quinary into the decimal scale. Again, the summing up of the 10 fingers and 10 toes often results in the concept of a single whole, a lump sum, so to speak, and the savage then says “one man,” or something that gives utterance to this thought of a new unit. This leads the quinary into the vigesimal scale, and produces the combination so often found in certain parts of the world. Thus the inevitable tendency of any number system of quinary origin is toward the establishment of another and larger base, and the formation of a number system in which both are used. Wherever this is done, the greater of the two bases is always to be regarded as the principal number base of the language, and the 5 as entirely subordinate to it. It is hardly correct to say that, as a number system is extended, the quinary element disappears and gives place to the decimal or vigesimal, but rather that it becomes a factor of quite secondary importance in the development of the scale. If, for example, 8 is expressed by 5-3 in a quinary decimal system, 98 will be  $9_{10} + 5-3$ . The quinary element does not disappear, but merely sinks into a relatively unimportant position.

One of the purest examples of quinary numeration is that furnished by the Betoya scale, already given in full in Chapter III., and briefly mentioned at the beginning of this chapter. In the simplicity and regularity of its construction it is so noteworthy that it is worth repeating, as the first of the long list of quinary systems given in the following pages. No further comment is needed on it than that already made in connection with its digital significance. As far as given by Dr. Brinton the scale is:

1. tey.
2. cayapa.

3. toazumba.
4. cajezea = 2 with plural termination.
5. teente = hand.
6. teyente tey = hand 1.
7. teyente cayapa = hand 2.
8. teyente toazumba = hand 3.
9. teyente caesea = hand 4.
10. caya ente, or caya huena = 2 hands.
11. caya ente-tey = 2 hands 1.
15. toazumba-ente = 3 hands.
16. toazumba-ente-tey = 3 hands 1. 20. caesea ente = 4 hands.

A far more common method of progression is furnished by languages which interrupt the quinary formation at 10, and express that number by a single word. Any scale in which this takes place can, from this point onward, be quinary only in the subordinate sense to which allusion has just been made. Examples of this are furnished in a more or less perfect manner by nearly all so-called quinary-vigesimal and quinary-decimal scales. As fairly representing this phase of number-system structure, I have selected the first 20 numerals from the following languages:

WELSH.

1. un.
2. dau.
3. tri.



4. pedwar.
5. pump.
6. chwech.
7. saith.
8. wyth.
9. naw.
10. deg.
11. un ar ddeg =  $1 + 10$ .
12. deuddeg =  $2 + 10$ .
13. tri ar ddeg =  $3 + 10$ .
14. pedwar ar ddeg =  $4 + 10$ .
15. pymtheg =  $5 + 10$ .
16. un ar bymtheg =  $1 + 5 + 10$ .
17. dau ar bymtheg =  $2 + 5 + 10$ .
18. tri ar bymtheg =  $3 + 5 + 10$ .
19. pedwar ar bymtheg =  $4 + 5 + 10$ .
20. ugain.

NAHUATL.

1. ce.
2. ome.
3. yei.

4. nauï.
5. macuilli.
6. chiquacen = [5] + 1.
7. chicome = [5] + 2.
8. chicuey = [5] + 3.
9. chiucnauï = [5] + 4.
10. matlactli.
11. matlactli oce = 10 + 1.
12. matlactli omome = 10 + 2.
13. matlactli omey = 10 + 3.
14. matlactli onnauï = 10 + 4.
15. caxtolli.\_16. caxtolli oce = 15 + 1.
17. caxtolli omome = 15 + 2.
18. caxtolli omey = 15 + 3.
19. caxtolli onnauï = 15 + 4.
20. cempualli = 1 account.

#### CANAQUE NEW CALEDONIA.

1. chaguin.
2. carou.
3. careri.

4. caboue

5. cani.

6. cani-mon-chaguin = 5 + 1.

7. cani-mon-carou = 5 + 2.

8. cani-mon-careri = 5 + 3.

9. cani-mon-caboue = 5 + 4.

10. panrere.

11. panrere-mon-chaguin = 10 + 1.

12. panrere-mon-carou = 10 + 2.

13. panrere-mon-careri = 10 + 3.

14. panrere-mon-caboue = 10 + 4.

15. panrere-mon-cani = 10 + 5.

16. panrere-mon-cani-mon-chaguin = 10 + 5 + 1.

17. panrere-mon-cani-mon-carou = 10 + 5 + 2.

18. panrere-mon-cani-mon-careri = 10 + 5 + 3.

19. panrere-mon-cani-mon-caboue = 10 + 5 + 4.

20. jaquemo = 1 person.

GUATO.

1. cenai.

2. dououni.

3. coum.
4. dekai.
5. quinoui.
6. cenai-caicaira = 1 on the other?
7. dououni-caicaira = 2 on the other?
8. coum-caicaira = 3 on the other?
9. dekai-caicaira = 4 on the other?
10. quinoi-da =  $5 \times 2$ .
11. cenai-ai-caibo = 1 + (the) hands.
12. dououni-ai-caibo = 2 + 10.
13. coum-ai-caibo = 3 + 10.
14. dekai-ai-caibo = 4 + 10.
15. quin-oibo =  $5 \times 3$ .
16. cenai-ai-quacoibo = 1 + 15.
17. dououni-ai-quacoibo = 2 + 15.
18. coum-ai-quacoibo = 3 + 15.
19. dekai-ai-quacoibo = 4 + 15.
20. quinoui-ai-quacoibo = 5 + 15.

The meanings assigned to the numerals 6 to 9 are entirely conjectural. They obviously mean 1, 2, 3, 4, taken a second time, and as the meanings I have given are often found in primitive systems, they have, at a venture, been given here.

LIFU, LOYALTY ISLANDS.

1. ca.
2. lue.
3. koeni.
4. eke.
5. tji pi.
6. ca ngemen = 1 above.
7. lue ngemen = 2 above.
8. koeni ngemen = 3 above.
9. eke ngemen = 4 above.
10. lue pi = 2x5.
11. ca ko.
12. lue ko.
13. koeni ko.
14. eke ko.
15. koeni pi = 3x5.
16. ca huai ano.
17. lua huai ano.
18. koeni huai ano.
19. eke huai ano.

20. ca atj = 1 man.

BONGO.

1. kotu.

2. ngorr.

3. motta.

4. neheo.

5. mui.

6. dokotu = [5] + 1.

7. dongorr = [5] + 2.

8. domotta = [5] + 3.

9. doheo = [5] + 4.

10. kih.

11. ki dokpo kotu = 10 + 1.

12. ki dokpo ngorr = 10 + 2.

13. ki dokpo motta = 10 + 3.

14. ki dokpo neheo = 10 + 4.

15. ki dokpo mui = 10 + 5.

16. ki dokpo mui do mui okpo kotu = 10 + 5 more, to 5, 1 more.

17. ki dokpo mui do mui okpo ngorr = 10 + 5 more, to 5, 2 more.

18. ki dokpo mui do mui okpo motta = 10 + 5 more, to 5, 3 more.

19. ki dokpo mui do mui okpo nehea = 10 + 5 more, to 5, 4 more.

20. mbaba kotu.

Above 20, the Lufu and the Bongo systems are vigesimal, so that they are, as a whole, mixed systems.

The Welsh scale begins as though it were to present a pure decimal structure, and no hint of the quinary element appears until it has passed 15. The Nahuatl, on the other hand, counts from 5 to 10 by the ordinary quinary method, and then appears to pass into the decimal form. But when 16 is reached, we find the quinary influence still persistent; and from this point to 20, the numeral words in both scales are such as to show that the notion of counting by fives is quite as prominent as the notion of referring to 10 as a base. Above 20 the systems become vigesimal, with a quinary or decimal structure appearing in all numerals except multiples of 20. Thus, in Welsh, 36 is *unarbymtheg ar ugain*, 1 + 5 + 10 + 20; and in Nahuatl the same number is *cempualli caxtollioce*, 20 + 15 + 1. Hence these and similar number systems, though commonly alluded to as vigesimal, are really mixed scales, with 20 as their primary base. The Canaque scale differs from the Nahuatl only in forming a compound word for 15, instead of introducing a new and simple term.

In the examples which follow, it is not thought best to extend the lists of numerals beyond 10, except in special instances where the illustration of some particular point may demand it. The usual quinary scale will be found, with a few exceptions like those just instanced, to have the following structure or one similar to it in all essential details: 1, 2, 3, 4, 5, 5-1, 5-2, 5-3, 5-4, 10, 10-1, 10-2, 10-3, 10-4, 10-5, 10-5-1, 10-5-2, 10-5-3, 10-5-4, 20. From these forms the entire system can readily be constructed as soon as it is known whether its principal base is to be 10 or 20.

Turning first to the native African languages, I have selected the following quinary scales from the abundant material that has been collected by the various explorers of the "Dark Continent." In some cases the numerals of certain tribes, as given by one writer, are found to differ widely from the same numerals as reported by

another. No attempt has been made at comparison of these varying forms of orthography, which are usually to be ascribed to difference of nationality on the part of the collectors.

#### FELOOPS.

1. enory.
2. sickaba, or cookaba.
3. sisajee.
4. sibakeer.
5. footuck.
6. footuck-enory = 5-1.
7. footuck-cookaba = 5-2.
8. footuck-sisajee = 5-3.
9. footuck-sibakeer = 5-4.
10. sibankonyen.

#### KISSI.

1. pili.
2. miu.
3. nga.
4. iol.
5. nguenu.
6. ngom-pum = 5-1.



7. ngom-miu = 5-2.

8. ngommag = 5-3.

9. nguenu-iol = 5-4.

10. to.

ASHANTEE.

1. tah.

2. noo.

3. sah.

4. nah.

5. taw.

6. torata = 5 + 1.

7. toorifeenoo = 5 + 2.

8. toorifeessa = 5 + 3.

9. toorifeena = 5 + 4.

10. nopnoo.

BASA.

1. do.

2. so.

3. ta.

4. hinye.

5. hum.

6. hum-le-do =  $5 + 1$ .

7. hum-le-so =  $5 + 2$ .

8. hum-le-ta =  $5 + 3$ .

9. hum-le-hinyo =  $5 + 4$ .

10. bla-bue.

JALLONKAS.

1. kidding.

2. fidding.

3. sarra.

4. nani.

5. soolo.

6. seni.

7. soolo ma fidding =  $5 + 2$ .

8. soolo ma sarra =  $5 + 3$ .

9. soolo ma nani =  $5 + 4$ .

10. nuff.

KRU.

1. da-do.

2. de-son.

3. de-tan.

4. de-nie.

5. de-mu.

6. dme-du = 5-1.

7. ne-son = [5] + 2.

8. ne-tan = [5] + 3.

9. sepadu = 10 – 1?

10. pua.

JALOFFS.

1. wean.

2. yar.

3. yat.

4. yanet.

5. judom.

6. judom-wean = 5-1.

7. judom-yar = 5-2.

8. judom-yat = 5-3.

9. judom yanet = 5-4.

10. fook.

GOLO.

1. mbali.
2. bisi.
3. bitta.
4. banda.
5. zonno.
6. tsimmi tongbali =  $5 + 1$ .
7. tsimmi tobisi =  $5 + 2$ .
8. tsimmi tobitta =  $5 + 3$ .
9. tsimmi to banda =  $5 + 4$ .
10. nifo.

#### FOULAH.

1. go.
2. deeddee.
3. tettee.
4. nee.
5. jouee.
6. jego =  $5-1$ .
7. jedeeddee =  $5-2$ .
8. je-tettee =  $5-3$ .
9. je-nee =  $5-4$ .

10. sappo.

SOUSSOU.

1. keren.

2. firing.

3. sarkan.

4. nani.

5. souli.

6. seni.

7. solo-fere = 5-2.

8. solo-mazarkan = 5 + 3.

9. solo-manani = 5 + 4.

10. fu.

BULLOM.

1. bul.

2. tin.

3. ra.

4. hyul.

5. men.

6. men-bul = 5-1.

7. men-tin = 5-2.\_8. men-ra = 5-3.\_9. men-hyul = 5-4.\_10. won.

VEI.

1. dondo.
2. fera.
3. sagba.
4. nani.
5. soru.
6. sun-dondo = 5-1.
7. sum-fera = 5-2.
8. sun-sagba = 5-3.
9. sun-nani = 5-4.
10. tan.

DINKA.

1. tok.
2. rou.
3. dyak.
4. nuan.
5. wdyets.
6. wdetem = 5-1.
7. wderou = 5-2.
8. bet, bed = 5-3.

9. wdenuan = 5-4.

10. wtyer = 5x2.

TEMNE.

1. in.

2. ran.

3. sas.

4. anle.

5. tr-amat.

6. tr-amat rok-in = 5 + 1.

7. tr-amat de ran = 5 + 2.

8. tr-amat re sas = 5 + 3.

9. tr-amat ro n-anle = 5 + 4.

10. tr-ofatr.

ABAKER.

1. kili.

2. bore.

3. dotla.

4. ashe.

5. ini.

6. im kili = 5-1.

7. im-bone = 5-2.

8. ini-dotta = 5-3.

9. tin ashe = 5-4.

10. chica.

BAGRIMMA.

1. kede.

2. sab.

3. muta.

4. so.

5. mi.

6. mi-ga = 5 + 1.

7. tsidi.

8. marta = 5 + 2.

9. do-so = [5] + 3

10. duk-keme.

PAPAA.

1. depoo.

2. auwi.

3. ottong.

4. enne.



5. attong.

6. attugo.

7. atjuwe = [5] + 2.

8. attiatong = [5] + 3.

9. atjeenne = [5] + 4.

10. awo.

EFIK.

1. kiet.

2. iba.

3. ita.

4. inan.

5. itiun.

6. itio-kiet = 5-1.

7. itia-ba = 5-2.

8. itia-eta = 5-3.

9. osu-kiet = 10 – 1?

10. duup.

NUPE.

1. nini.

2. gu-ba.

3. gu-ta.

4. gu-ni.

5. gu-tsun.

6. gu-sua-yin = 5 + 1.

7. gu-tua-ba = 5 + 2.

8. gu-tu-ta = 5 + 3.

9. gu-tua-ni = 5 + 4.

10. gu-wo.

MOKKO.

1. kiae.

2. iba.

3. itta.

4. inan.

5. uettin.

6. itjueekee = 5 + 1.

7. ittiaba = 5 + 2.

8. itteiata = 5 + 3.

9. huschukiet.

10. bueb.

KANURI.

1. tilo.
2. ndi.
3. yasge.
4. dege.
5. ugu.
6. arasge =  $5 + 1$ .
7. tular.
8. wusge =  $5 + 3$ .
9. legar.
10. megu =  $2_5$ .

BININ.

1. bo.
2. be.
3. la.
4. nin.
5. tang.
6. tahu =  $5 + 1$ ?
7. tabi =  $5 + 2$ .
8. tara =  $5 + 3$ .
9. ianin (tanin?) =  $5 + 4$ ?

10. te.

KREDY.

1. baia.

2. rommu.

3. totto.

4. sosso.

5. saya.

6. yembobaia = [5] + 1.

7. yemborommu = [5] + 2.

8. yembototto = [5] + 3.

9. yembososso = [5] + 4.

10. puh.

HERERO.

1. mue.

2. vari.

3. tatu.

4. ne.

5. tano.

6. hambou-mue = [5] + 1.

7. hambou-vari = [5] + 2.

8. hambou-tatu = [5] + 3.

9. hambou-ne = [5] + 4.

10.

KI-YAU.

1. jumo.

2. wawiri.

3. watatu.

4. mcheche.

5. msano.

6. musano na jumo = 5 + 1.

7. musano na wiri = 5 + 2.

8. musano na watatu = 5 + 3.

9. musano na mcheche = 5 + 4.

10. ikumi.

FERNANDO PO.

1. muli.

2. mempa.

3. meta.

4. miene.

5. mimito.

6. mimito na muli =  $5 + 1$ .

7. mimito na mempa =  $5 + 2$ .

8. mimito na meta =  $5 + 3$ .

9. mimito na miene =  $5 + 4$ .

10. miemieu =  $5-5$ ?

#### KI-NYASSA

1. kimodzi.

2. vi-wiri.

3. vi-tatu.

4. vinye.

5. visano.

6. visano na kimodzi =  $5 + 1$ .

7. visano na vi-wiri =  $5 + 2$ .

8. visano na vitatu =  $5 + 3$ .

9. visano na vinye =  $5 + 4$ .

10. chikumi.

#### BALENGUE.

1. guevoho.

2. ibare.

3. raro.

4. inai.
5. itano.
6. itano na guevoho =  $5 + 1$ .
7. itano na ibare =  $5 + 2$ .
8. itano na raro =  $5 + 3$ .
9. itano na inai =  $5 + 4$ .
10. ndioum, or nai-hinai.

#### KUNAMA.

1. ella.
2. bare.
3. sadde.
4. salle.
5. kussume.
6. kon-t'-ella = hand 1.
7. kon-te-bare = hand 2.
8. kon-te-sadde = hand 3.
9. kon-te-salle = hand 4.
10. kol-lakada.

#### GOLA.

1. ngoumou.

2. ntie.

3. ntai.

4. tina.

5. nonon.

6. diegoum = [5] + 1.

7. dientie = [5] + 2.

8. dietai = [5] + 3.

9. dectina = [5] + 4.

10. esia.

BAREA.

1. doko

2. arega.

3. sane.

4. sone.

5. oita.

6. data.

7. dz-ariga = 5 + 2.

8. dis-sena = 5 + 3.

9. lefete-mada = without 10.

10. lefek.



MATIBANI.

1. mosa.
2. pili.
3. taru.
4. teje.
5. taru.
6. tana mosa = 5-1.
7. tana pili = 5-2.
8. tana taru = 5-3.
9. loco.
10. loco nakege.

BONZE.

1. tan.
2. vele.
3. daba.
4. nani.
5. lolou.
6. maida = [5] + 1.
7. maifile = [5] + 2.
8. maishaba = [5] + 3.

9. mainan = [5] + 4.

10. bou.

MPOVI

1. moueta.

2. bevali.

3. betata.

4. benai.

5. betani.

6. betani moueta = 5-1.

7. betani bevali = 5-2.

8. betani betata = 5-3.

9. betani benai = 5-4.

10. nchinia.

TRITON'S BAY, NEW GUINEA.

1. samosi.

2. roueti.

3. tourou.

4. faat.

5. rimi.

6. rim-samosi = 5-1.

7. rim-roueti = 5-2.

8. rim-tourou = 5-3.

9. rim-faat = 5-4.

10. outsia.

ENDE, OR FLORES.

1. sa.

2. zua.

3. telu.

4. wutu.

5. lima = hand.

6. lima-sa = 5-1, or hand 1.

7. lima-zua = 5-2.

8. rua-butu = 2x4?

9. trasa = [10] – 1?

10. sabulu.

MALLICOLO.

1. tseekaee.

2. ery.

3. erei.

4. ebats.

5. ereem.

6. tsookae = [5] + 1.

7. gooy = [5] + 2.

8. hoorey = [5] + 3.

9. goodbats = [5] + 4.

10. senearn.

#### EBON, MARSHALL ISLANDS.

1. iuwun.

2. drud.

3. chilu.

4. emer.

5. lailem.

6. chilchinu = 5 + 1.

7. chilchime = 5 + 2.

8. twalithuk = [10] – 2.

9. twahmejuwou = [10] – 1.

10. iungou.

#### UEA, LOYALTY ISLAND.

1. tahi.

2. lua.

3. tolu.

4. fa.

5. lima.

6. tahi.

7. lua.

8. tolu.

9. fa.

10. lima.

UEA.—[another dialect.]

1. hacha.

2. lo.

3. kuun.

4. thack.

5. thabumb.

6. lo-acha = 2d 1.

7. lo-alo = 2d 2.

8. lo-kuun = 2d 3.

9. lo-thack = 2d 4.

10. lebenetee.

ISLE OF PINES.

1. ta.
2. bo.
3. beti.
4. beu.
5. ta-hue.
6. no-ta = 2d 1.
7. no-bo = 2d 2.
8. no-beti = 2d 3.
9. no-beu = 2d 4.
10. de-kau.

UREPARAPARA, BANKS ISLANDS.

1. vo towa.
2. vo ro.
3. vo tol.
4. vo vet.
5. teveliem = 1 hand.
6. leve jea = other 1.
7. leve ro = other 2.
8. leve tol = other 3.
9. leve vet = other 4.

10. sanowul = 2 sets.

MOTA, BANKS ISLANDS.

1. tuwale.

2. nirua.

3. nitol.

4. nivat.

5. tavelima = 1 hand.

6. laveatea = other 1.

7. lavearua = other 2.

8. laveatol = other 3.

9. laveavat = other 4.

10. sanavul = 2 sets.

NEW CALEDONIA.

1. parai.

2. paroo.

3. parghen.

4. parbai.

5. panim.

6. panim-gha = 5-1.

7. panim-roo = 5-2.

8. panim-ghen = 5-3.

9. panim-bai = 5-4.

10. parooneek.

YENGEN, NEW CAL.

1. hets.

2. heluk.

3. heyen.

4. pobits.

5. nim = hand.

6. nim-wet = 5-1.

7. nim-weluk = 5-2.

8. nim-weyen = 5-3.

9. nim-pobit = 5-4.

10. pain-duk.

ANEITEUM.

1. ethi.

2. ero.

3. eseik.

4. manohwan.

5. nikman.



6. nikman cled et ethi = 5 + 1.
7. nikman cled et oro = 5 + 2.
8. nikman cled et eseik = 5 + 3.
9. nikman cled et manohwan = 5 + 4.
10. nikman lep ikman = 5 + 5.

#### TANNA

1. riti.
2. karu.
3. kahar.
4. kefa.
5. krirum.
6. krirum riti = 5-1.
7. krirum karu = 5-2.
8. krirum kahar? = 5-3.
9. krirum kefa? = 5-4.
10. —

#### EROMANGA

1. sai.
2. duru.
3. disil.

4. divat.
5. siklim = 1 hand.
6. misikai = other 1?
7. siklim naru = 5-2.
8. siklim disil = 5-3.
9. siklim mindivat = 5 + 4.
10. narolim = 2 hands.

FATE, NEW HEB.

1. iskei.
2. rua.
3. tolu.
4. bate.
5. lima = hand.
6. la tesa = other 1.
7. la rua = other 2.
8. la tolu = other 3.
9. la fiti = other 4.
10. relima = 2 hands.

API, NEW HEB.

1. tai.

2. lua.
3. tolu.
4. vari.
5. lima = hand.
6. o rai = other 1.
7. o lua = other 2.
8. o tolo = other 3.
9. o vari = other 4.
10. lua lima = 2 hands.

SESAKE, NEW HEB.

1. sikai.
2. dua.
3. dolu.
4. pati.
5. lima = hand.
6. la tesa = other 1.
7. la dua = other 2.
8. la dolu = other 3.
9. lo veti = other 4.
10. dua lima = 2 hands.

PAMA, NEW HEB.

1. tai.
2. e lua.
3. e tolu.
4. e hati.
5. e lime = hand.
6. a hitai = other 1.
7. o lu = other 2.
8. o tolu = other 3.
9. o hati = other 4.
10. ha lua lim = 2 hands

AURORA, NEW HEB.

1. tewa.
2. i rua.
3. i tol.
4. i vat.
5. tavalima = 1 hand.
6. lava tea = other 1.
7. lava rua = other 2.
8. lava tol = other 3.

9. la vat = other 4.

10. sanwulu = two sets.

TOBI.

1. yat.

2. glu.

3. ya.

4. uan.

5. yanim = 1 hand.

6. yawor = other 1.

7. yavic = other 2.

8. yawa = other 3.

9. yatu = other 4.

10. yasec.

PALM ISLAND.

1. yonkol.

2. yakka.

3. tetjora.

4. tarko.

5. yonkol mala = 1 hand.

JAJOWERONG, VICTORIA.

1. kiarp.
2. bulaits.
3. bulaits kiarp = 2-1.
4. bulaits bulaits = 2-2.
5. kiarp munnar = 1 hand.
6. bulaits bulaits bulaits = 2-2-2.
10. bulaits munnar = 2 hands.

The last two scales deserve special notice. They are Australian scales, and the former is strongly binary, as are so many others of that continent. But both show an incipient quinary tendency in their names for 5 and 10.

#### CAMBODIA.

1. muy.
2. pir.
3. bey.
4. buon.
5. pram.
6. pram muy = 5-1.
7. pram pil = 5-2.
8. pram bey = 5-3.
9. pram buon = 5-4.
10. dap.

## TSCHUKSCHI.

1. inen.
2. nirach.
3. n'roch.
4. n'rach.
5. miligen = hand.
6. inen miligen = 1-5.
7. nirach miligen = 2-5.
8. anwrotkin.
9. chona tsinki.
10. migitken = both hands.

## KOTTISCH

1. hutsa.
2. ina.
3. tona.
4. sega.
5. chega.
6. chelutsa = 5 + 1.
7. chelina = 5 + 2.
8. chaltona = 5 + 3.

9. tsumnaga = 10 – 1.

10. haga.

#### ESKIMO OF N.-W. ALASKA.

1. a towshek.

2. hipah, or malho.

3. pingishute.

4. sesaimat.

5. talema.

6. okvinile, or ahchegaret = another 1?

7. talema-malronik = 5-two of them.

8. pingishu-okvingile = 2d 3?

9. kolingotalia = 10 – 1?

10. koleet.

#### KAMTSCHATKA, SOUTH.

1. dischak.

2. kascha.

3. tschook.

4. tschaaka.

5. kumnaka.

6. ky'lkoka.



7. itatyk = 2 + 5.

8. tschookotuk = 3 + 5.

9. tschuaktuk = 4 + 5.

10. kumechtuk = 5 + 5.

#### ALEUTS

1. ataqan.

2. aljak.

3. qankun.

4. sitsin.

5. tsan = my hand.

6. atun = 1 + 5.

7. ulun = 2 + 5.

8. qamtsin = 3 + 5.

9. sitsin = 4 + 5.

10. hatsiq.

#### TCHIGLIT, MACKENZIE R.

1. ataotcirkr.

2. aypak, or malloerok.

3. illaak, or pinatcut.

4. tcitamat.

5. tallemat.

6. arveneloerit.

7. arveneloerit-aypak =  $5 + 2$ .

8. arveneloerit-illaak =  $5 + 3$ .

9. arveneloerit-tcitamat =  $5 + 4$ .

10. krolit.

SAHAPTIN (NEZ PERCES).

1. naks.

2. lapit.

3. mitat.

4. pi-lapt =  $2_2$ .

5. pachat.

6. oi-laks =  $[5] + 1$ .

7. oi-napt =  $[5] + 2$ .

8. oi-matat =  $[5] + 3$ .

9. koits.

10. putimpt.

GREENLAND.

1. atauseq.

2. machdluq.

3. pinasut.
4. sisamat
5. tadlimat.
6. achfineq-atauseq = other hand 1.
7. achfineq-machdluq = other hand 2.
8. achfineq-pinasut = other hand 3.
9. achfineq-sisamat = other hand 4.
10. qulit.
11. achqaneq-atauseq = first foot 1.
12. achqaneq-machdluq = first foot 2.
13. achqaneq-pinasut = first foot 3.
14. achqaneq-sisamat = first foot 4.
15. achfechsaneq?
16. achfechsaneq-atauseq = other foot 1.
17. achfechsaneq-machdlup = other foot 2.
18. achfechsaneq-pinasut = other foot 3.
19. achfechsaneq-sisamat = other foot 4.
20. inuk navdlucho = a man ended.

Up to this point the Greenlander's scale is almost purely quinary. Like those of which mention was made at the beginning of this chapter, it persists in progressing by fives until it reaches 20, when it announces a new base, which shows that the system will from now on be vigesimal. This scale is one of the most interesting of which we have any record, and will be noticed again in the next

chapter. In many respects it is like the scale of the Point Barrow Eskimo, which was given early in Chapter III. The Eskimo languages are characteristically quinary-vigesimal in their number systems, but few of them present such perfect examples of that method of counting as do the two just mentioned.

#### CHIPPEWAY.

1. bejig.
2. nij.
3. nisswi.
4. niwin.
5. nanun.
6. ningotwasswi = 1 again?
7. nijwasswi = 2 again?
8. nishwasswi = 3 again?
9. jangasswi = 4 again?
10. midasswi = 5 again.

#### MASSACHUSETTS.

1. nequt.
2. neese.
3. nish.
4. yaw.
5. napanna = on one side, *i.e.* 1 hand.

6. nequuttatash = 1 added. \_7. nesausuk = 2 again? \_8. shawosuk = 3 again? \_9. pashoogun = it comes near, *i.e.* to 10. \_10. puik.

#### OJIBWA OF CHEGOIMEGON.

1. bashik. \_2. neensh. \_3. niswe. \_4. newin. \_5. nanun. \_6. ningodwaswe = 1 again? \_7. nishwaswe = 2 again? \_8. shouswe = 3 again? \_9. shangaswe = 4 again? \_10. medaswe = 5 again?

#### OTTAWA.

1. ningotchau. 2. ninjwa. \_3. niswa. \_4. niwin. \_5. nanau. \_6. ningotwaswi = 1 again? \_7. ninjwaswi = 2 again? \_8. nichwaswi = 3 again? \_9. shang. \_10. kwetch.

#### DELAWARE.

1. n'gutti. 2. niskha. \_3. nakha. \_4. newa. \_5. nalan [akin to palenach, hand]. \_6. guttash = 1 on the other side. \_7. nishash = 2 on the other side. \_8. khaash = 3 on the other side. \_9. peshgonk = coming near. \_10. tellen = no more.

#### SHAWNOE.

1. negote. \_2. neshwa. \_3. nithuie. \_4. newe. \_5. nialinwe = gone. \_6. negotewathwe = 1 further. \_7. neshwathwe = 2 further. \_8. sashekswa = 3 further? \_9. chakatswe [akin to chagisse, "used up"]. \_10. metathwe = no further.

#### MICMAC.

1. naiookt. \_2. tahboo. \_3. seest. \_4. naioo. \_5. nahn. \_6. usoo-cum. \_7. eloo-igunuk. \_8. oo-gumoolchin. \_9. pescoonaduk. \_10. mtlin.

One peculiarity of the Micmac numerals is most noteworthy. The numerals are real verbs, instead of adjectives, or, as is sometimes the case, nouns. They are conjugated through all the variations of mood, tense, person, and number. The forms given above are not those that would be used in counting, but are for specific use, being

varied according to the thought it was intended to express. For example, *naiooktaich* = there is 1, is present tense; *naiooktaichcus*, there was 1, is imperfect; and *encoodaichdedou*, there will be 1, is future. The variation in person is shown by the following inflection:

#### PRESENT TENSE.

1st pers. tahboosee-ek = there are 2 of us. 2d pers. tahboosee-yok = there are 2 of you. 3d pers. tahboo-sijik = there are 2 of them.

#### IMPERFECT TENSE.

1st pers. tahboosee-egup = there were 2 of us. 2d pers. tahboosee-yogup = there were 2 of you. 3d pers. tahboosee-sibunik = there were 2 of them.

#### FUTURE TENSE.

3d pers. tahboosee-dak = there will be 2 of them, etc.

The negative form is also comprehended in the list of possible variations. Thus, *tahboo-seekw*, there are not 2 of them; *mah tahboo-seekw*, there will not be 2 of them; and so on, through all the changes which the conjugation of the verb permits.

#### OLD ALGONQUIN.

1. peygik.\_2. ninsh.\_3. nisswey.\_4. neyoo.\_5. nahran = gone.\_6. ningootwassoo = 1 on the other side.\_7. ninshwassoo = 2 on the other side.\_8. nisswassoo = 3 on the other side.\_9. shangassoo [akin to chagisse, "used up"].\_10. mitassoo = no further.

#### OMAHA.

1. meeatchchee.\_2. nomba.\_3. rabeenee.\_4. tooba.\_5. satta = hand, *i.e.* all the fingers turned down.\_6. shappai = 1 more.\_7. painumba = fingers 2.\_8. pairabeenee = fingers 3.\_9. shonka = only 1 finger (remains).\_10. kraibaira = unbent.

CHOCTAW.

1. achofee.
2. tuklo.
3. tuchina.
4. ushta.
5. tahlape = the first hand ends.
6. hanali.
7. untuklo = again 2.
8. untuchina = again 3.
9. chokali = soon the end; *i.e.* next the last.
10. pokoli.

CADDOE.

1. kouanigh.
2. behit.
3. daho.
4. hehweh.
5. dihsehkou.
6. dunkeh.
7. bisekah =  $5 + 2$ .
8. dousehka =  $5 + 3$ .

9. hehwehsehka = 4 + hand.

10. behnehaugh.

### CHIPPEWAY.

1. payshik.

2. neesh.

3. neeswoy.

4. neon.

5. naman = gone.

6. nequtwosswoy = 1 on the other side.

7. neeshswosswoy = 2 on the other side.

8. swoswoy = 3 on the other side?

9. shangosswoy [akin to chagissi, “used up”].

10. metosswoy = no further.

### ADAIZE.

1. nancas.

2. nass.

3. colle.

4. tacache.

5. seppacan.

6. pacanancus = 5 + 1.



7. pacaness =  $5 + 2$ .

8. pacalcon =  $5 + 3$ .

9. sickinish = hands minus?

10. neusne.

PAWNEE.

1. askoo.

2. peetkoo.

3. touweet.

4. shkeetiksh.

5. sheeooksh = hands half.

6. sheekshabish =  $5 + 1$ .

7. peetkoosheeshabish =  $2 + 5$ .

8. touweetshabish =  $3 + 5$ .

9. looksheereewa =  $10 - 1$ .

10. looksheeree =  $2d 5?$

MINSI.

1. gutti.

2. niskha.

3. nakba.

4. newa.

5. nulan = gone?

6. guttash = 1 added.

7. nishoash = 2 added.

8. khaash = 3 added.

9. noweli.

10. wimbat.

KONLISCHEN.

1. tlek.

2. tech.

3. nezk.

4. taakun.

5. kejetschin.

6. klet uschu =  $5 + 1$ .

7. tachate uschu =  $5 + 2$ .

8. nesket uschu =  $5 + 3$ .

9. kuschok =  $10 - 1$ ?

10. tschinkat.

TLINGIT.

1. tlek.

2. deq.

3. natsk.
4. dak'on = 2d 2.
5. kedjin = hand.
6. tle durcu = other 1.
7. daqa durcu = other 2.
8. natska durcu = other 3.
9. gocuk.\_10. djinkat = both hands.

RAPID, OR FALL, INDIANS.

1. karci.
2. neece.
3. narce.
4. nean.
5. yautune.
6. neteartuce = 1 over?
7. nesartuce = 2 over?
8. narswartuce = 3 over?
9. anharbetwartuce = 4 over?
10. mettartuce = no further?

HEILTSUK.

1. men.

2. matl.
3. yutq.
4. mu.
5. sky'a.
6. katla.
7. matlaaus = other 2?
8. yutquaous = other 3?
9. mamene = 10 – 1.
10. aiky'as.

NOOTKA.

1. nup.
2. atla.
3. katstsa.
4. mo.
5. sutca.
6. nopo = other 1?
7. atlpo = other 2?
8. atlakutl = 10 – 2.
9. ts'owakutl = 10 – 1.
10. haiu.

TSIMSHIAN.

1. gyak.
2. tepqat.
3. guant.
4. tqalpq.
5. kctonc (from *anon*, hand).
6. kalt = 2d 1.
7. t'epqalt = 2d 2.
8. guandalt = 2d 3?
9. kctemac.
10. gy'ap.

BILQULA.

1. (s)maotl.
2. tlnos.
3. asmost.
4. mos.
5. tsech.
6. tqotl = 2d 1?
7. nustlnos = 2d 2?
8. k'etlnos = 2x4.

9. k'esman.

10. tskchlakcht.

MOLELE.

1. mangu.

2. lapku.

3. mutka.

4. pipa.

5. pika.

6. napitka = 1 + 5.

7. lapitka = 2 + 5.

8. mutpitka = 3 + 5.

9. laginstshiatkus.

10. nawitspu.

WAILLATPU.

1. na.

2. leplin.

3. matnin.

4. piping.

5. tawit.

6. noina = [5] + 1.

7. noilip = [5] + 2.

8. noimat = [5] + 3.

9. tanauiaishimshim.

10. ningitelp.

LUTUAMI.

1. natshik.

2. lapit.

3. ntani.

4. wonip.

5. tonapni.

6. nakskishuptane = 1 + 5.

7. tapkishuptane = 2 + 5.

8. ndanekishuptane = 3 + 5.

9. natskaiakish = 10 – 1.

10. taunip.

SASTE (SHASTA).

1. tshiamu.

2. hoka.

3. hatski.

4. irahaia.

5. etsha.

6. tahaia.

7. hokaikinis =  $2 + 5$ .

8. hatsikikiri =  $3 + 5$ .

9. kirihariki-ikiriu.

10. etsehewi.

CAHUILLO.

1. supli.

2. mewi.

3. mepai.

4. mewittsu.

5. nomekadmun.

6. kadmun-supli =  $5-1$ .

7. kan-munwi =  $5-2$ .

8. kan-munpa =  $5-3$ .

9. kan-munwitsu =  $5-4$ .

10. nomatsumi.

TIMUKUA.

1. yaha.

2. yutsa.



3. hapu.

4. tseketa.

5. marua.

6. mareka = 5 + 1

7. pikitsa = 5 + 2

8. pikinahu = 5 + 3

9. peke-tsaketa = 5 + 4

10. tuma.

OTOMI

1. nara.

2. yocho.

3. chiu.

4. gocho.

5. kuto.

6. rato = 1 + 5.

7. yoto = 2 + 5.

8. chiato = 3 + 5.

9. guto = 4 + 5.

10. reta.

TARASCO.

1. ma.
2. dziman.
3. tanimo.
4. tamu.
5. yumu.
6. kuimu.
7. yun-dziman = [5] + 2.
8. yun-tanimo = [5] + 3.
9. yun-tamu = [5] + 4.
10. temben.

MATLALTZINCAN.

1. indawi.
2. inawi.
3. inyuhu.
4. inkunowi.
5. inkutaa.
6. inda-towi = 1 + 5.
7. ine-towi = 2 + 5.
8. ine-ukunowi = 2-4.
9. imuratadahata = 10 – 1?

10. inda-hata.

CORA.

1. ceaut.

2. huapoa.

3. huaeica.

4. moacua.

5. anxuvi.

6. a-cevi = [5] + 1.

7. a-huapoa = [5] + 2.

8. a-huaeica = [5] + 3.

9. a-moacua = [5] + 4.

10. tamoamata (akin to moamati, “hand”).

AYMARA.

1. maya.

2. paya.

3. kimsa.

4. pusi.

5. piska.

6. tsokta.

7. pa-kalko = 2 + 5.

8. kimsa-kalko = 3 + 5.

9. pusi-kalko = 4 + 5. \_10. tunka.

### CARIBS OF ESSEQUIBO, GUIANA.

1. oween.

2. oko.

3. oroowa.

4. oko-baimema.

5. wineetanee = 1 hand.

6. owee-puimapo = 1 again?

7. oko-puimapo = 2 again?

8. oroowa-puimapo = 3 again?

9. oko-baimema-puimapo = 4 again?

10. oween-abatoro.

### CARIB. (ROUCOUYENNE?)

1. aban, amoin.

2. biama.

3. eleoua.

4. biam-bouri = 2 again?

5. ouacabo-apourcou-aban-tibateli.

6. aban laoyagone-ouacabo-apourcou.

7. biama laoyagone-ouacabo-apourcou.

8. eleoua laoyagone-ouacabo-apourcou.

9. —

10. chon noucabo.

It is unfortunate that the meanings of these remarkable numerals cannot be given. The counting is evidently quinary, but the terms used must have been purely descriptive expressions, having their origin undoubtedly in certain gestures or finger motions. The numerals obtained from this region, and from the tribes to the south and east of the Carib country, are especially rich in digital terms, and an analysis of the above numerals would probably show clearly the mental steps through which this people passed in constructing the rude scale which served for the expression of their ideas of number.

#### KIRIRI.

1. biche.

2. watsani.

3. watsani dikie.

4. sumara oroba.

5. mi biche misa = 1 hand.

6. mirepri bu-biche misa sai.

7. mirepri watsani misa sai.

8. mirepri watsandikie misa sai.

9. mirepri sumara oraba sai.\_10. mikriba misa sai = both hands.

#### CAYUBABA

1. pebi.
2. mbeta.
3. kimisa.
4. pusi.
5. pisika.
6. sukuta.
7. pa-kaluku = 2 again?
8. kimisa-kaluku = 3 again?
9. pusu-kaluku = 4 again?
10. tunka.

#### SAPIBOCONA

1. karata.
2. mitia.
3. kurapa.
4. tsada.
5. maidara (from *arue*, hand).
6. karata-rirobo = 1 hand with.
7. mitia-rirobo = 2 hand with.
8. kurapa-rirobo = 3 hand with.
9. tsada-rirobo = 4 hand with.\_10. bururutse = hand hand.

TICUNA.

1. hueih.
2. tarepueh.
3. tompueh.
4. aguemoujih
5. hueamepueh.
6. naimehueapueh =  $5 + 1$ .
7. naimehueatareh =  $5 + 2$ .
8. naimehueatameapueh =  $5 + 3$ .
9. gomeapueh =  $10 - 1$ .
10. gomeh.

YANUA.

1. tckini.
2. nanojui.
3. munua.
4. nairojuino =  $2d 2$ .
5. tenaja.
6. teki-natea = 1 again?
7. nanojui-natea = 2 again?
8. munua-natea = 3 again?

9. nairojuino-natea = 4 again?

10. huijejuino =  $2 \times 5$ ?

The foregoing examples will show with considerable fulness the wide dispersion of the quinary scale. Every part of the world contributes its share except Europe, where the only exceptions to the universal use of the decimal system are the half-dozen languages, which still linger on its confines, whose number base is the vigesimal. Not only is there no living European tongue possessing a quinary number system, but no trace of this method of counting is found in any of the numerals of the earlier forms of speech, which have now become obsolete. The only possible exceptions of which I can think are the Greek [Greek: pempazein], to count by fives, and a few kindred words which certainly do hint at a remote antiquity in which the ancestors of the Greeks counted on their fingers, and so grouped their units into fives. The Roman notation, the familiar I., II., III., IV. (originally IIII.), V., VI., etc., with equal certainty suggests quinary counting, but the Latin language contains no vestige of anything of the kind, and the whole range of Latin literature is silent on this point, though it contains numerous references to finger counting. It is quite within the bounds of possibility that the prehistoric nations of Europe possessed and used a quinary numeration. But of these races the modern world knows nothing save the few scanty facts that can be gathered from the stone implements which have now and then been brought to light. Their languages have perished as utterly as have the races themselves, and speculation concerning them is useless. Whatever their form of numeration may have been, it has left no perceptible trace on the languages by which they were succeeded. Even the languages of northern and central Europe which were contemporary with the Greek and Latin of classical times have, with the exception of the Celtic tongues of the extreme North-west, left behind them but meagre traces for the modern student to work on. We presume that the ancient Gauls and Goths, Huns and Scythians, and other barbarian tribes had the same method of numeration that their descendants now have; and it is a matter of certainty that the decimal scale was, at that time, not used with the universality which now obtains; but wherever the decimal was not used, the universal method was vigesimal; and that the quinary



ever had anything of a foothold in Europe is only to be guessed from its presence to-day in almost all of the other corners of the world.

From the fact that the quinary is that one of the three natural scales with the smallest base, it has been conjectured that all tribes possess, at some time in their history, a quinary numeration, which at a later period merges into either the decimal or the vigesimal, and thus disappears or forms with one of the latter a mixed system. In support of this theory it is urged that extensive regions which now show nothing but decimal counting were, beyond all reasonable doubt, quinary. It is well known, for example, that the decimal system of the Malays has spread over almost the entire Polynesian region, displacing whatever native scales it encountered. The same phenomenon has been observed in Africa, where the Arab traders have disseminated their own numeral system very widely, the native tribes adopting it or modifying their own scales in such a manner that the Arab influence is detected without difficulty.

In view of these facts, and of the extreme readiness with which a tribe would through its finger counting fall into the use of the quinary method, it does not at first seem improbable that the quinary was *the* original system. But an extended study of the methods of counting in vogue among the uncivilized races of all parts of the world has shown that this theory is entirely untenable. The decimal scale is no less simple in its structure than the quinary; and the savage, as he extends the limit of his scale from 5 to 6, may call his new number 5-1, or, with equal probability, give it an entirely new name, independent in all respects of any that have preceded it. With the use of this new name there may be associated the conception of "5 and 1 more"; but in such multitudes of instances the words employed show no trace of any such meaning, that it is impossible for any one to draw, with any degree of safety, the inference that the signification was originally there, but that the changes of time had wrought changes in verbal form so great as to bury it past the power of recovery. A full discussion of this question need not be entered upon here. But it will be of interest to notice two or three numeral scales in which the quinary influence is so faint as to be hardly discernible. They

are found in considerable numbers among the North American Indian languages, as may be seen by consulting the vocabularies that have been prepared and published during the last half century. From these I have selected the following, which are sufficient to illustrate the point in question:

QUAPPA.

1. milchtih.
2. nonnepah.
3. dahghenih.
4. tuah.
5. sattou.
6. schappeh.
7. pennapah.
8. pehdaghenih.
9. schunkkah.
10. gedeh bonah.

TERRABA.

1. krara.
2. krowue.
3. krom miah.
4. krob king.
5. krasch kingde.

6. terdeh.
7. kogodeh.
8. kwongdeh.
9. schkawdeh.
10. dwowdeh.

#### MOHICAN

1. ngwitloh.
2. neesoh.
3. noghhoh.
4. nauwoh.
5. nunon.
6. ngwittus.
7. tupouwus.
8. ghusooh.
9. nauneeweh.
10. mtannit.

In the Quappa scale 7 and 8 appear to be derived from 2 and 3, while 6 and 9 show no visible trace of kinship with 1 and 4. In Mohican, on the other hand, 6 and 9 seem to be derived from 1 and 4, while 7 and 8 have little or no claim to relationship with 2 and 3. In some scales a single word only is found in the second quinate to indicate that 5 was originally the base on which the system rested. It is hardly to be doubted, even, that change might affect each and every one of the numerals from 5 to 10 or 6 to 9, so that a

dependence which might once have been easily detected is now unrecognizable.

But if this is so, the natural and inevitable question follows—might not this have been the history of all numeral scales now purely decimal? May not the changes of time have altered the compounds which were once a clear indication of quinary counting, until no trace remains by which they can be followed back to their true origin? Perhaps so. It is not in the least degree probable, but its possibility may, of course, be admitted. But even then the universality of quinary counting for primitive peoples is by no means established. In Chapter II, examples were given of races which had no number base. Later on it was observed that in Australia and South America many tribes used 2 as their number base; in some cases counting on past 5 without showing any tendency to use that as a new unit. Again, through the habit of counting upon the finger joints, instead of the fingers themselves, the use of 3 as a base is brought into prominence, and 6 and 9 become 2 threes and 3 threes, respectively, instead of  $5 + 1$  and  $5 + 4$ . The same may be noticed of 4. Counting by means of his fingers, without including the thumbs, the savage begins by dividing into fours instead of fives. Traces of this form of counting are somewhat numerous, especially among the North American aboriginal tribes. Hence the quinary form of counting, however widespread its use may be shown to be, can in no way be claimed as the universal method of any stage of development in the history of mankind.

In the vast majority of cases, the passage from the base to the next succeeding number in any scale, is clearly defined. But among races whose intelligence is of a low order, or—if it be permissible to express it in this way—among races whose number sense is feeble, progression from one number to the next is not always in accordance with any well-defined law. After one or two distinct numerals the count may, as in the case of the Veddas and the Andamans, proceed by finger pantomime and by the repetition of the same word. Occasionally the same word is used for two successive numbers, some gesture undoubtedly serving to distinguish the one from the other in the savage's mind. Examples of this are not infrequent among the forest tribes of South America.

In the Tariana dialect 9 and 10 are expressed by the same word, *paihipawalianuda*; in Cobeu, 8 and 9 by *pepelicoloblicouilini*; in Barre, 4, 5, and 9 by *ualibucubi*. In other languages the change from one numeral to the next is so slight that one instinctively concludes that the savage is forming in his own mind another, to him new, numeral immediately from the last. In such cases the entire number system is scanty, and the creeping hesitancy with which progress is made is visible in the forms which the numerals are made to take. A single illustration or two of this must suffice; but the ones chosen are not isolated cases. The scale of the Macunis, one of the numerous tribes of Brazil, is

1. pocchaenang.
2. haihg.
3. haigunhgnill.
4. haihgtschating.
5. haihgtschihating = another 4?
6. hathig-stchihathing = 2-4?
7. hathink-tschihathing = 2-5?
8. hathink-tschihating = 2x4?

The complete absence of— one is tempted to say —any rhyme or reason from this scale is more than enough to refute any argument which might tend to show that the quinary, or any other scale, was ever the sole number scale of primitive man. Irregular as this is, the system of the Montagnais fully matches it, as the subjoined numerals show:

1. inl'are.
2. nak'e.
3. t'are.

4. dinri.

5. se-sunlare.

6. elkke-t'are =  $2 \times 3$ .

7. t'a-ye-oyertan =  $10 - 3$ , or inl'as dinri =  $4 + 3$ ?

8. elkke-dinri =  $2 \times 4$ .

9. inl'a-ye-oyertan =  $10 - 1$ .

10. onernan.