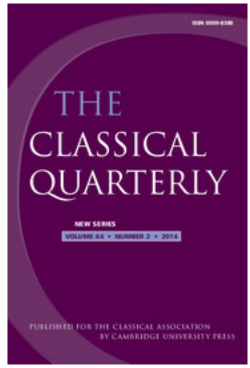

The *Digamma, Koppa*, and *Sampi* as Numerals in Greek

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THE *DIGAMMA*, *KOPPA*, AND *SAMPI* AS NUMERALS IN GREEK.

IT is universally held and in all classical Greek Grammars taught that in their numeral system, the ancient Greeks denoted the figure for 6 by the *digamma* or *vau*, that for 90 by the *koppa*, and that for 900 by the *sampi* or *sanpi*. On a closer examination, however, this doctrine proves erroneous and requires correction.

To begin with, we know that the Greeks of the classical period used the figures ΓΙ for 6, 𐅄ΔΔΔΔ for 90, and ΓΗ(or 𐅅)ΗΗΗΗ for 900. As a matter of fact, the symbols Ϝ and Ϙ were never counted among the Greek numerals, evidently because they had become extinct long before Eucleidian times (403 B.C.), and so had found no place, even as letters, in the Eucleidian or new Attic alphabet. As to the numeral system which used Ϛ (also Ͷ, later ς) for 6, and Ϙ (later ϙ or ϟ) for 90, then Ͳ (also Ͳ, later ϡ) for 900, it sprang up in Alexandrian times—in the first half of the third century B.C.—probably in Alexandria itself (Meisterhans[3] 11, note 41; see also T. M. Thompson, *Palaeography* p. 104)—whence it seems to have worked its way into the other Greek centres, Athens adopting it about the middle of the first century B.C. (Meisterhans[3] 11, 6).

This Alexandrian system of numerals was decimal and had, as is well known, 27 symbols or figures accented and arranged in three parallel columns, the first column denoting the units, the second the tenths, and the third the hundreds, viz.:

Α = 1	Ι = 10	Ρ = 100
Β = 2	Κ = 20	Σ = 200
Γ = 3	Λ = 30	Τ = 300
Δ = 4	Μ = 40	Υ = 400
Ε = 5	Ν = 50	Φ = 500
Ϛ or Ͷ = 6	Ξ = 60	Χ = 600
Ζ = 7	Ο = 70	Ψ = 700
Η = 8	Π = 80	Ω = 800
Θ (or Ο) = 9	Ϙ = 90	Ͳ (or Ͳ) = 900

͵Α = 1000, ͵Β = 2000, ͵Γ = 3000, and so on.

Let us now see whether the traditional doctrine still obtaining is correct which says that ϛ (for 6), ϙ (for 90), and ϡ (σαμπῖ, for 900) are identical with the archaic letters ϝ, ϙ, and ϟ or Σ. We know that these *letters*, the supposed prototypes of the Alexandrian figures ϛ (Ͱ), ϙ, ϡ (Ͳ), became extinct several centuries before the appearance of the above Alexandrian or decimal system which contained the above 27 symbols. In particular we know that the old koppa (ϙ) was a dead letter in classical antiquity (A. Gercke, *Abriss* 85, 92, Brugmann *Greek Grammar*[3] 38), whereas the *σάν* was merely an ancient Doric name for *σῖγμα*, Hdt. I. 139: *τωὐτὸ γράμμα τὸ Δωριέες μὲν σ ὰ ν καλέουσι, Ἴωνες δὲ σῖγμα.* So too Athen. II. 37 (p. 467 A): *τὸ δὲ σ ὰ ν ἀντὶ τοῦ σ ῖ γ μ α εἰρήκασιν—καὶ τοὺς ἵππους τοὺς τὸ* C *ἐγκεχαραγμένον ἔχοντας σ α μ φόρας καλοῦσιν.* So further 10. 81 (p. 454); then Schol. in Ar. *Nub.* 23 and 122. Suid. s.v. *σαμφόρας: εἶδος ἵππου ἐγκεχαραγμένου τὸ* C *σημεῖον· οἱ δὲ Δωριεῖς τὸ* C *σ ὰ ν λέγουσιν.*

In these circumstances it may be worth our while to investigate the subject for the benefit of our younger Greek scholars, who meet the above symbols as numerals in their Greek grammar.

Three serious difficulties are raised by the time-honoured belief that the archaic or pre-Eucleidian letters ϙ (*κόππα*), ϝ (*δίγαμμα*) and ϟ (*σάν*) reappeared in Alexandrian times as numerals or figures: (1) by the intrinsic improbability that the Alexandrian Greeks, after inventing a host of grammatical, musical, and other signs, were at a loss concerning the three numeral symbols in question; (2) by the difficulty of realizing how the signs ϙ ϝ ϟ, which, in old Attic times, never had acted as numeral ciphers but only as phonetic symbols or letters, should, many centuries after, be revived in Alexandria as figures, that is in a function totally different from that which they originally had; and (3) by the difficulty of accounting for the alphabetic *place* of the said symbols in the Alexandrian numeral system. It looks certainly odd how the primordial *letter* koppa (ϙ) should, after it became extinct before the sixth century B.C., reappear, three centuries after, in Alexandria and that as a *figure*, taking the eighteenth place in the Alexandrian and Byzantine numeral alphabet of the 27 symbols. True, the original shape of the figure, ϙ, its place after Π, and its name 'koppa,' prima facie seem to leave no reasonable doubt as to its identity with the Latin Q,[1] and to its descent or revival from the primordial ϙ (*κόππα*, the Phenician Qoph); but both the shape and the arithmetic value of the Alexandrian symbol ϙ (later diffentiated to ϟ and ϙ) for 90 prove it to be simply an I (iota) carrying on the top the letter ϴ or O (theta), which was then often written without the central dot or horizontal stroke (Larfeld *Gr. Epigr.* pp. 533 f.). Now we should recollect here that in their system of multiplication the ancient (Alexandrian) Greeks used to write the multiplicator above or upon the multiplicand, thus: $\overset{\text{B}}{\text{M}}$ for *δὶς* (*β'*) *μύρια* (*μ'*), that is $2 \times 10{,}000 = 20{,}000$; $\overset{\text{P}}{\text{M}}$ for *ἑκατοντάκις* (*ρ'*) *μύρια* that is $100 \times 10{,}000 = 1{,}000{,}000$ (whence

[1] Compare Quint. I. 4. 9: koppa apud Graecos nunc tantum in numero manet.

Koraes coined the modern Greek term τὸ ἑκατομμύριον for a 'million'). On this system, then, ϙ or ϟ means ἐνάκις δέκα (9 × 10), that is ἐνενήκοντα (90).

Regarding the old digamma, considered in its Alexandrian function as a figure, the error is no less striking. For we know that the digamma Ϝ had from the outset the shape of two gammas ΓΓ, one placed upon the other (Ϝ) and that, like the ϟ, it never had a place in the Eucleidian or (new) Attic alphabet, neither as a letter nor as a numeral. On the other hand, its supposed Alexandrian progeny or substitute had the shape of ꞓ or ⊓, thus forming two reverted gammas either joined one upon the other: ꞓ or intertwisted ⊓. Now as one gamma (Γ) has the arithmetic value of 'three' (3), two gammas naturally equal two threes or a *six* (Γ = 3, ꞓ or ⊓ = 6); from which we realize that this numerical symbol (ꞓ or ⊓) has nothing in common with the ancient digamma (Ϝ). Indeed, even the name points to a different origin. For while the ancient digamma (Ϝ) was so called from its shape as a double gamma (Ϝ), the numeral symbol ꞓ or ⊓ went by the name ἐπίσημον (apparently sometimes also γαμ(μ)έξ), its name στῖγμα (formed after σῖγμα) having arisen in late Byzantine times—after the seventh century A.D.—from its shape ϛ which then resembled the ligature ϛ (for στ), then generally current in the MSS.[1]

Still more curious is the history of the *sambi* (ϡ = 900). Its original or Alexandrian shape was ͳ, a form which gave rise to its tracing back to the Phenician letter *shin* (T). This outward resemblance, however, is accidental, as accidental as was the resemblance of ϟ to the primordial koppa. And this accidental character appears both from its *name* as well as from its *function*, seeing that the Greek *sampi* or *sanpi* is not called σίν from 'shin,' and that the Phenician numeral system cannot be brought into line with that of the Greeks (P. Schröder, *Die Phön. Sprache*, table C). Indeed the Greek name σαμπῖ or σαμπεῖ which is supposed to come from σὰν + πῖ(πεῖ) is a play of imagination, seeing that σὰν + πῖ would have produced σπάν or σπῖ, just as σ + τ produced στῖγμα (after σῖγμα). As a matter of fact, the numeral symbol ͳ is a genuine Greek invention: it is a triple *Tau* (TTT) or a *pi* (Π) with a middle (central) leg, as Galen himself says (xvii. 1. 525 Kühn): ὁ τοῦ Π χαρακτὴρ ἔχων ὀρθίαν μέσην γραμμήν, ὥς ἔνιοι γράφουσι τὸν τῶν ἐνακοσίων χαρακτῆρα. Now a capital 'Π with a middle perpendicular stroke' naturally forms a triple *Tau* (ͳ), which threefold T in the cursive hand had its side strokes curved. Accordingly the symbol ͳ assumed the rounded shape Ͳ and this again gradually—since Byzantine times—became ϡ, that is a backward slanting Π, then called παρακύϊσμα (not σαμπῖ!), that is a παρακλῖνον γέννημα, a slanting letter. Schol. in *Dion Thr.* p. 496, 5 (ed. Hilgard): γράμματα δὲ καὶ τὰ παρὰ Χαλδαίοις καὶ Αἰγυπτίοις καί

[1] The above curious facts—the formation of ϟ from I and O, and of ꞓ or ⊓ from ΓΓ—makes me sceptical about the view generally held that, in their palmiest days, the Athenians, being incapable of inventing a special phonetic symbol for the letter eta (B or H), or to evolve B out of EI, decided, in their despair, to have recourse to the revival of the then obsolete or rather long extinct H, and that they transformed it from a previous rough breathing (H = h) into a future letter (H = η). Compare on this subject my *Hist. Greek Grammar*, p. 531.

τινα ἕτερα, τὸ δίγαμμα καὶ τὸ κόππα καὶ τὸ καλούμενον παρακύϊσμα. So too Cramer's *An. Gr.* iv. p. 325, 33. It seems, then, that, as the symbol ϡ looked like a (slanting) Π, it was named, in late Byzantine times (after the thirteenth century) *σαμπῖ*, apparently from *ὡ]σ ἂν πῖ*, that is a 'Π-like' letter (Thompson *l.c.*). Be this as it may, the term *sampi*, whether it came from *σὰν+πῖ* or from *ὡ]σ ἂν πῖ*, is a worthless coinage of the Middle Ages and should disappear from our Greek grammars, making room for the proper term *παρακύϊσμα*.

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