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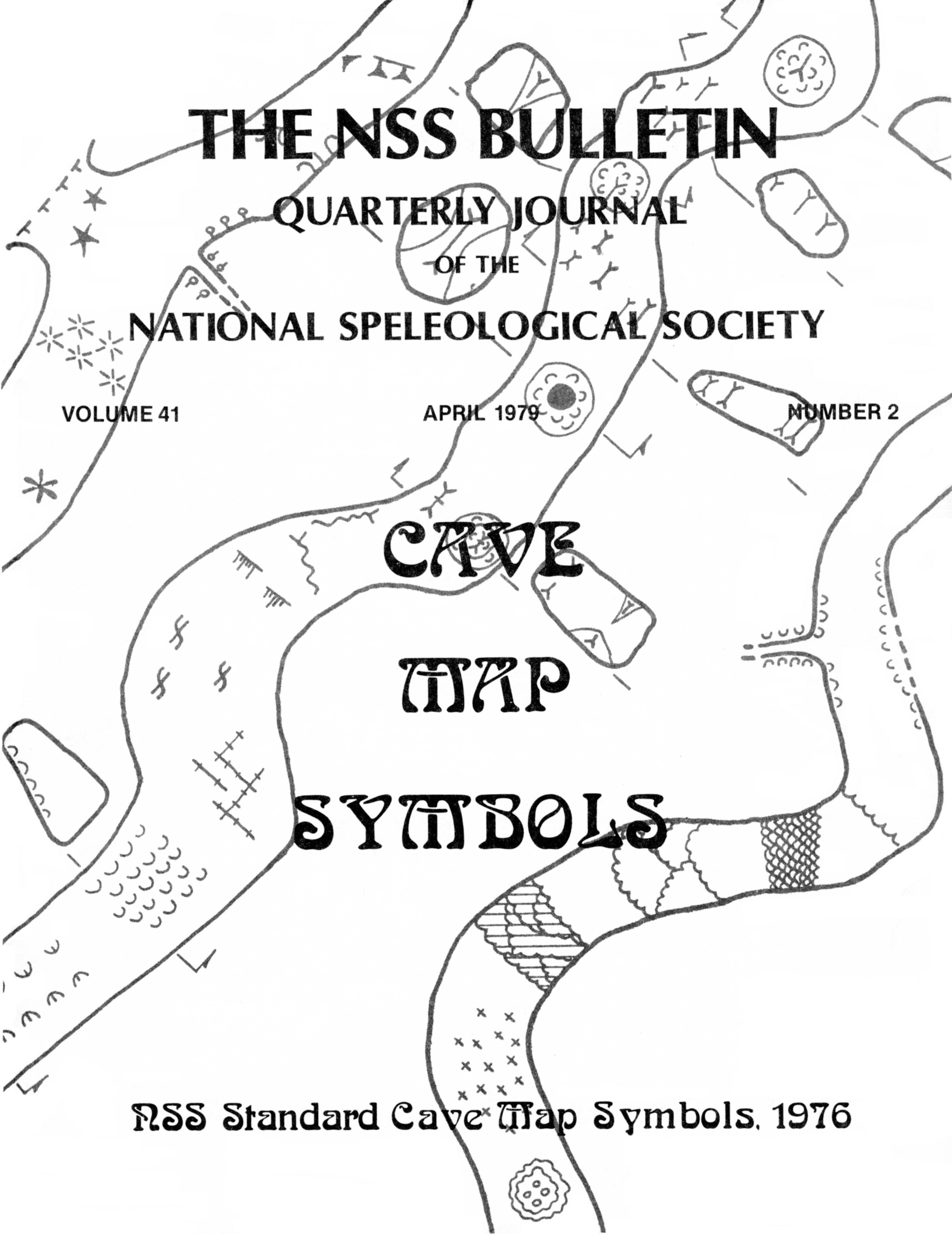

CAVE MAP SYMBOLS

NSS Standard Cave Map Symbols, 1976

Contents

Cover Drawing: Cave features symbolized (Bob Thrun).

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THE 1976 NSS STANDARD MAP SYMBOLS

*Standing Committee on Cave Map Symbols**
NSS Section on Cave Geology and Geography

INTRODUCTION

CAVE MAPS are the basic documents of speleology. An adequate map shows not only the widths and trends of the passages. It contains, also, the location of the cave, directions for reaching it, a geological summary, an outline of hydrology and meteorology, data on biota and their ecology, notes on history, an indication of the scenic value of the cave, and advice on the skills and equipment required to explore it. In short, the map must be a concise, encyclopaedic summary of the cave.

This information, permanently recorded in the form of printed maps, must be communicated through time as well as across space. Effective communication depends upon symbols the definitions of which are uniform throughout the world and unchanging through time. Neologisms should be introduced only when needed to express new concepts or to record new percepts; in no case, should new symbols conflict with those previously adopted. Individuality is preferred in layout, draughting, and lettering; it must be foresworn absolutely in regard to the symbols used in the map, in order to protect the primary information-transfer function of the map.

Maps intended for permanent reference should be surveyed to CRG Grade 5B, Level 2 standards (or higher) and published at a scale of not less than 1:240. Such a map, sometimes called an "Accurate Outline Survey," shows all of the passages in their proper (compensated) trends, widths, slopes, and interrelationships. It is a skeleton, only, but will serve as a reliable base to which specialists may later add their own data. Maps drawn from less precise surveys or published at smaller scales must be regarded as special-purpose maps and usually are wasted effort. They cannot meet the needs of specialists and will have to be done over in the future.

Cave cartographers, like other information specialists, are severely handicapped if limited to only a small vocabulary of symbols with which to formulate and to express their ideas. A complex cave can no more be represented by a dozen symbols than Basic English can accurately convey the nuances of Shakespeare. Twenty-nine of the most-often used symbols are presented separately on pages 36 and 37 as a vocabulary of "basic cave map symbols," but they are meant as an aid to beginning cavers, just as a pocket dictionary is meant for beginning language students. Cave cartographers cannot conceptualize and execute highly informative maps until they acquire a large vocabulary of symbols.

The 19 panels of 1976 NSS Standard Map Symbols which follow are largely compatible with lists of symbols published by AMCS, CRF, MSS, and other active mapping organizations in the United States. The Committee has obtained lists of symbols published elsewhere in the Americas, in Europe, and in the Near East; the NSS symbols are in many cases compatible with these symbols, also. We have made a deliberate attempt to achieve uniformity with the symbols proposed by the Union Internationale de Spéléologie†, but this has been neglected in a few cases (*viz*, "breakdown") where other symbols are so deeply ingrained in North American usage that attempts to change them would be futile.

PRESENTATION

Once a map has been surveyed, draughted, and field-checked, it becomes the pleasure of the cartographer to render the data in a clear, concise, and attractive fashion. The cave cartographer should entertain a passion for his work, but altogether too many maps reveal a love that languished. They are poorly laid out, hastily executed, and unequal to their calling.

The style in which a map is drawn is a matter of personal choice. All symbols proposed in this report remain clear and unambiguous, regardless of the materials and techniques used. A computer print-out can be as satisfying as an ornately hand-crafted map, providing that it is sufficiently detailed, has an open and legible construction, and is pleasing to behold. There is no conflict between utility and art; there *are* conflicts both between haste and utility and between haste and art.

The pencil layout and inking of each panel of map symbols in this report involved about 4 hours of work. No cave map should be attempted in less time, not even the smallest. We hope that the recently instituted annual NSS Cave Map Salon will encourage more careful work by cave cartographers.

Most cave cartographers, especially inexperienced ones, would be well advised to use guides and adhesive transfers rather than pen-and-ink. Good map design can partially compensate for the rigidities of draughting aids, and professional-appearing work can be produced after a few hours of practice. However, all serious cartographers should consider that pen-and-ink methods, once learned, are the cheapest, quickest, and most versatile of all. The most complex maps can be executed on an ordinary table with only a few dollars worth of pens, a style book, and a bottle of ink. Symbols and lettering can be easily adapted to the scale of the map and to the space available if done free-hand, but require a large investment in materials if done with guides and transfers.

The reader may consult Brod (1962), Hedges (1975-76), and Hosley (1971) for extended discussions of cartographic philosophy and techniques. The Geographical Institute of the University of Wroclaw (Poland) offers an MA program in cave mapping.

THE STANDARD MAP SYMBOLS

The 1976 NSS Standard Map Symbols were adopted by the Board of Governors on 2 July 1976. They may be freely copied by anyone for non-profit use and should be distributed as widely as possible.

Maps newly draughted for publication in The NSS Bulletin should follow the 1976 NSS Standard Map Symbols; they may not include symbols conflicting with these. Older maps can be published as originally drawn.

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* James Hedges, Bill Russell, Bob Thrun, William B. White

† The latest UIS report on map symbols, "Signes Spéléologiques Conventionnels" by Fabre and Audétat, is available for 25F (postpaid) from: CERGA, B.P. 5060, 34033 Montpellier Cédex, France. Bank foreign-exchange fees are roughly four times the cost of the publication, however. We recommend that it be obtained from Tony Oldham (Rhynchydwr, Crymych, Dyfed SA41 3RB, U.K.) or another bookseller who will accept payment in dollars.

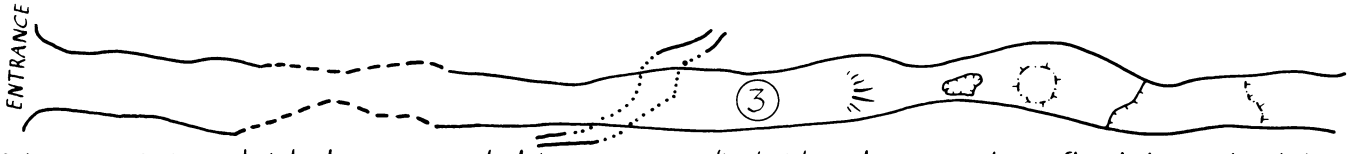
Twenty-nine of the most frequently used

BASIC CAVE MAP SYMBOLS

from the

NSS Standard Map Symbols, 1976

PASSAGE FEATURES

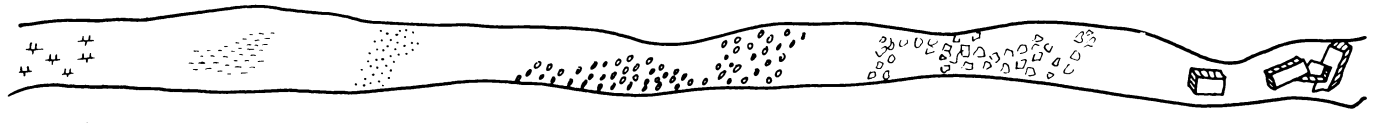


entrance passage sketched passage underlying passage ceiling height slope pit dome floor ledge ceiling ledge

SPELEOTHEMS

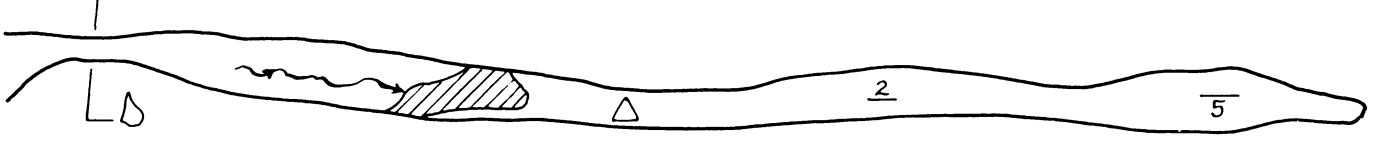
stalagmite stalactite small column large column soda straws flowstone rimstone dam

FLOOR MATERIALS



bedrock clay or silt sand gravel or cobbles small breakdown large breakdown

MISCELLANEOUS



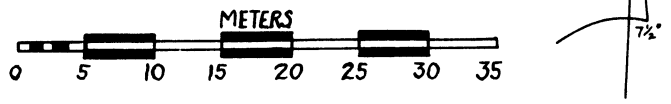
cross section stream water survey station elevation above datum elevation below datum

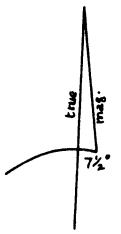
Chimerical Caverns

anne arundel county maryland

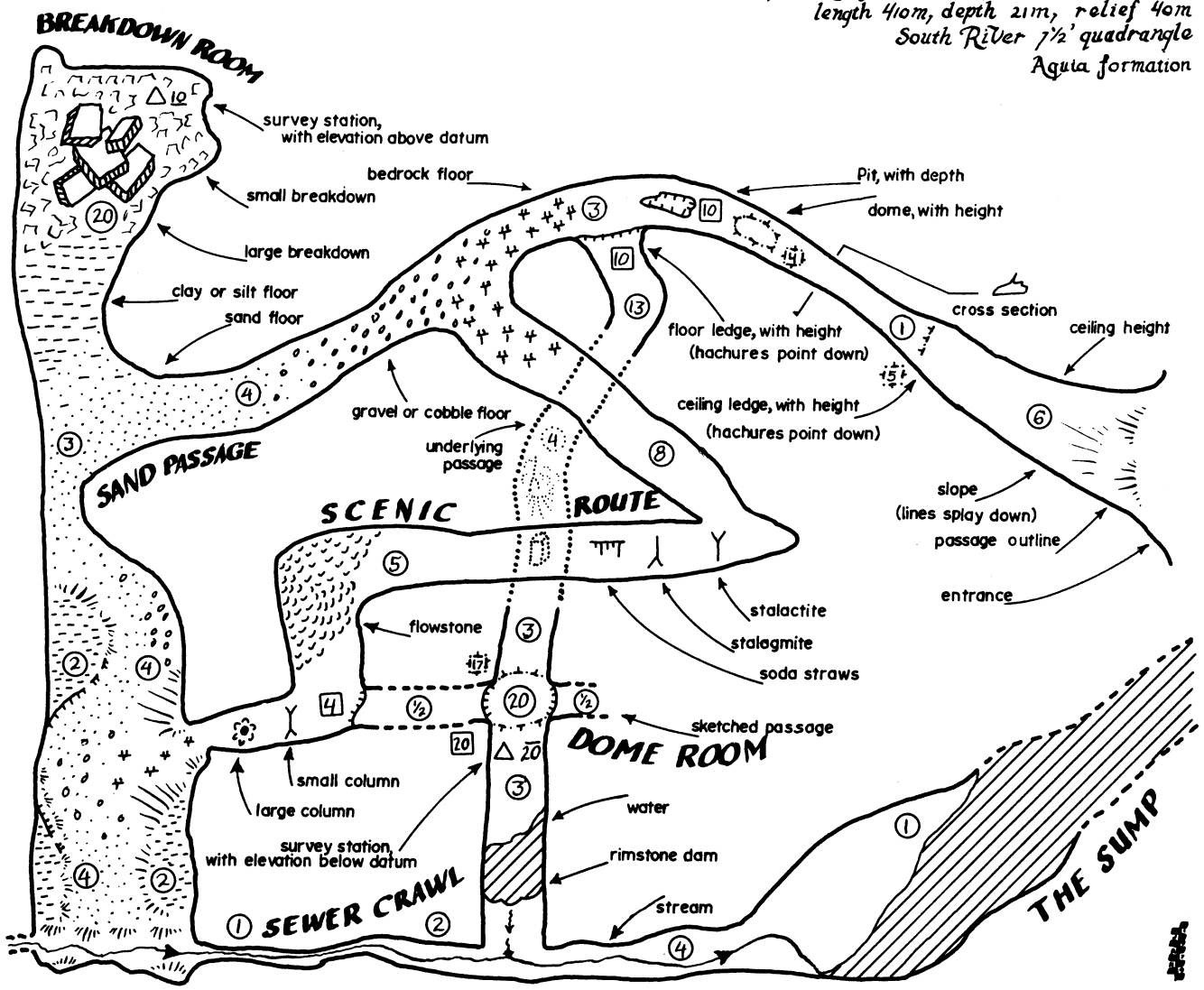
38° 58' 30" N Lat.
76° 30' 10" W Long.
15 meters apl

Illustrating the 1976 NSS Basic Cave Map Symbols





Surveyed by James Hedges, 6 February 1979
length 410m, depth 21m, relief 40m
South River 7½' quadrangle
Aquia formation



PASSAGES

Entrance

Drip line

Passage

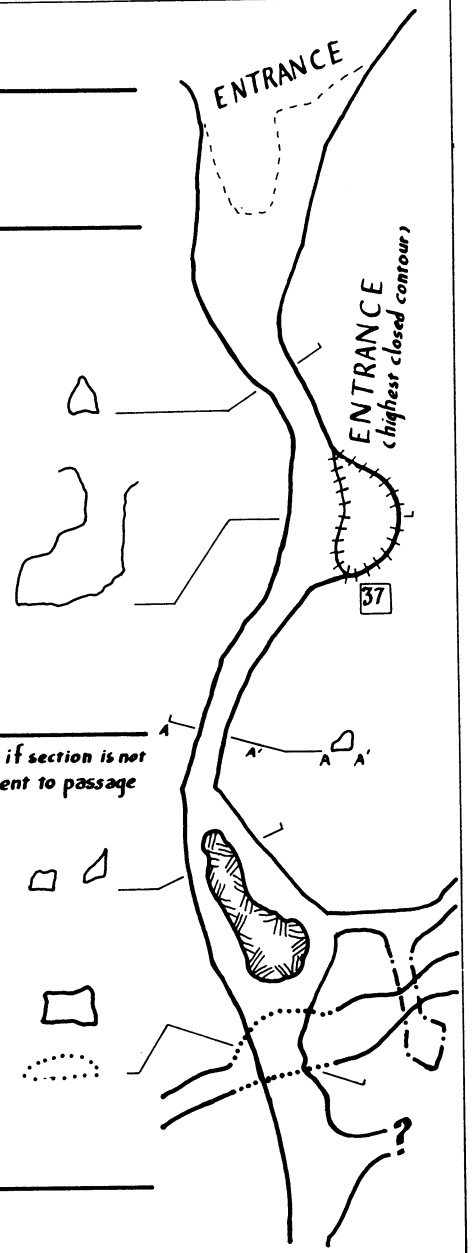
Vertical entrance, depth

Cross section — use key letter *only* if section is not drawn adjacent to passage

Pillar (bedrock)

Underlying *and overlying passages*

Unmapped passage



Slope

Measured slope

Vertical drop, depth

Artificial floor ledge, height

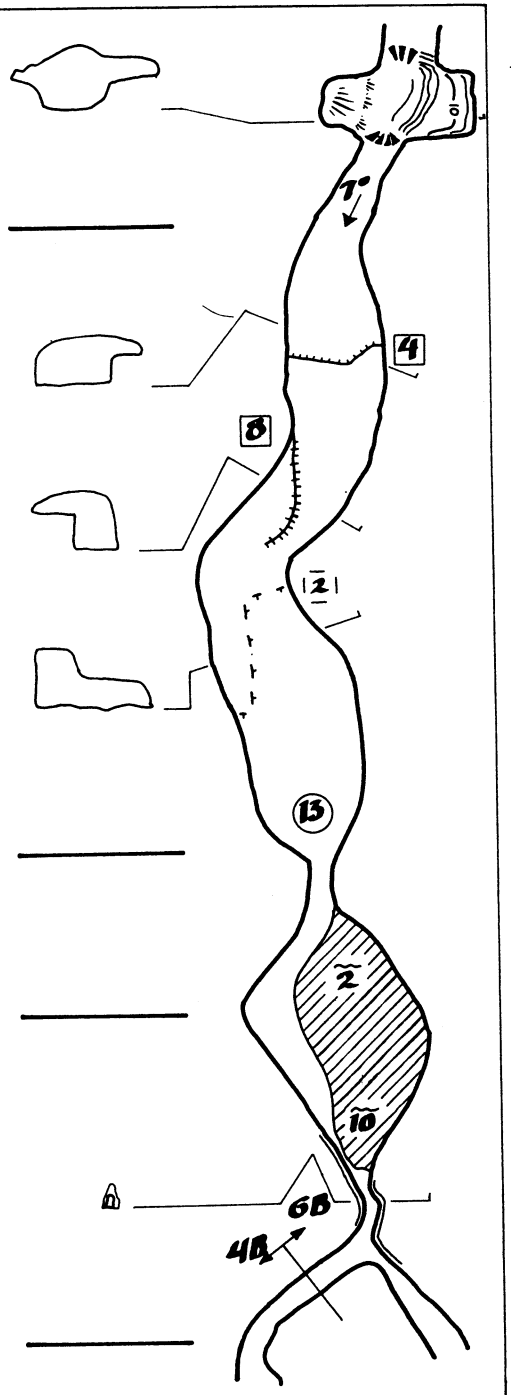
Ceiling ledge, height

Passage height (air-filled)

Water depth

Artificially enlarged passage

Change in grade of survey



SPELEOTHEMS

Large stalagmite (peak ʌ)

Stalagmites present

Stalagmite with stalactites

Stalactite over stalagmite

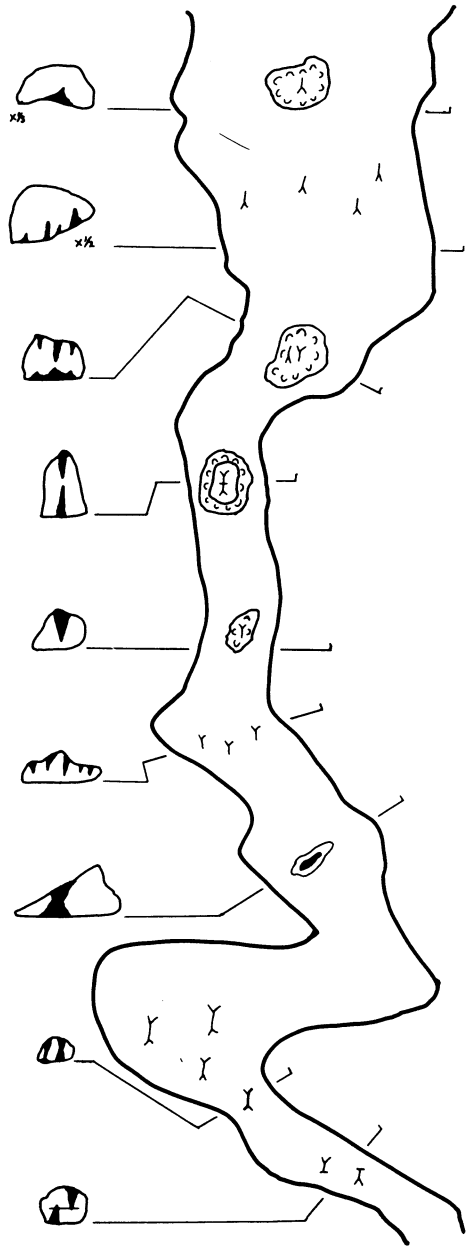
Large stalactite

Stalactites present

Column — only narrowest part is black

Columns present

Stalactiflat / stalagmiflat



Travertine blockade

Alluvial blockade

Breakdown blockade

Vegetal debris blockade

Detrital fill blockade

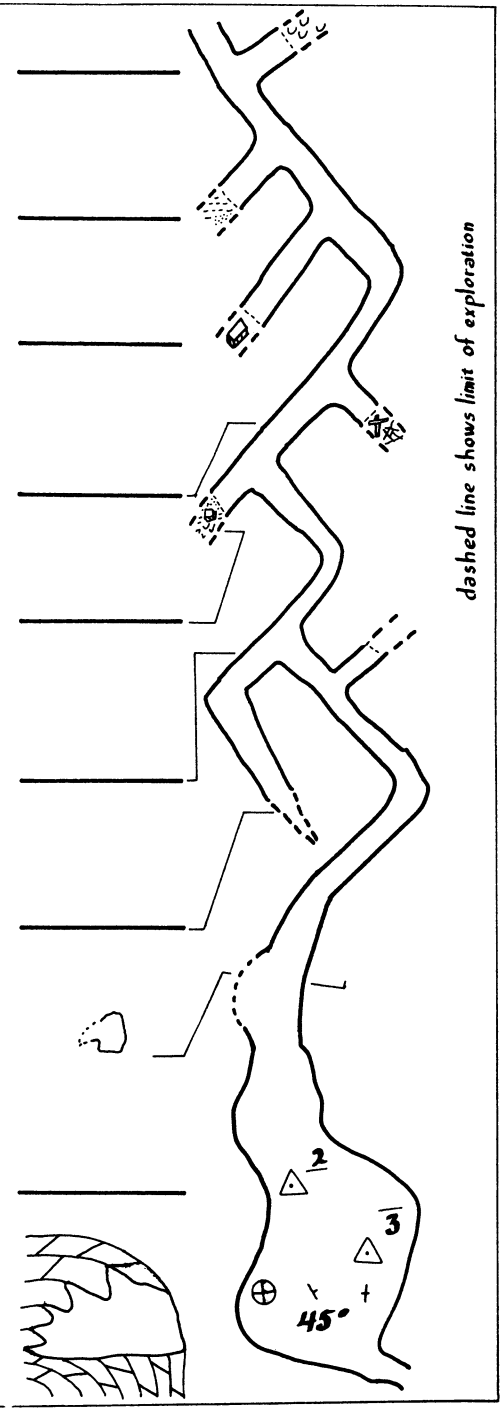
Continues, low

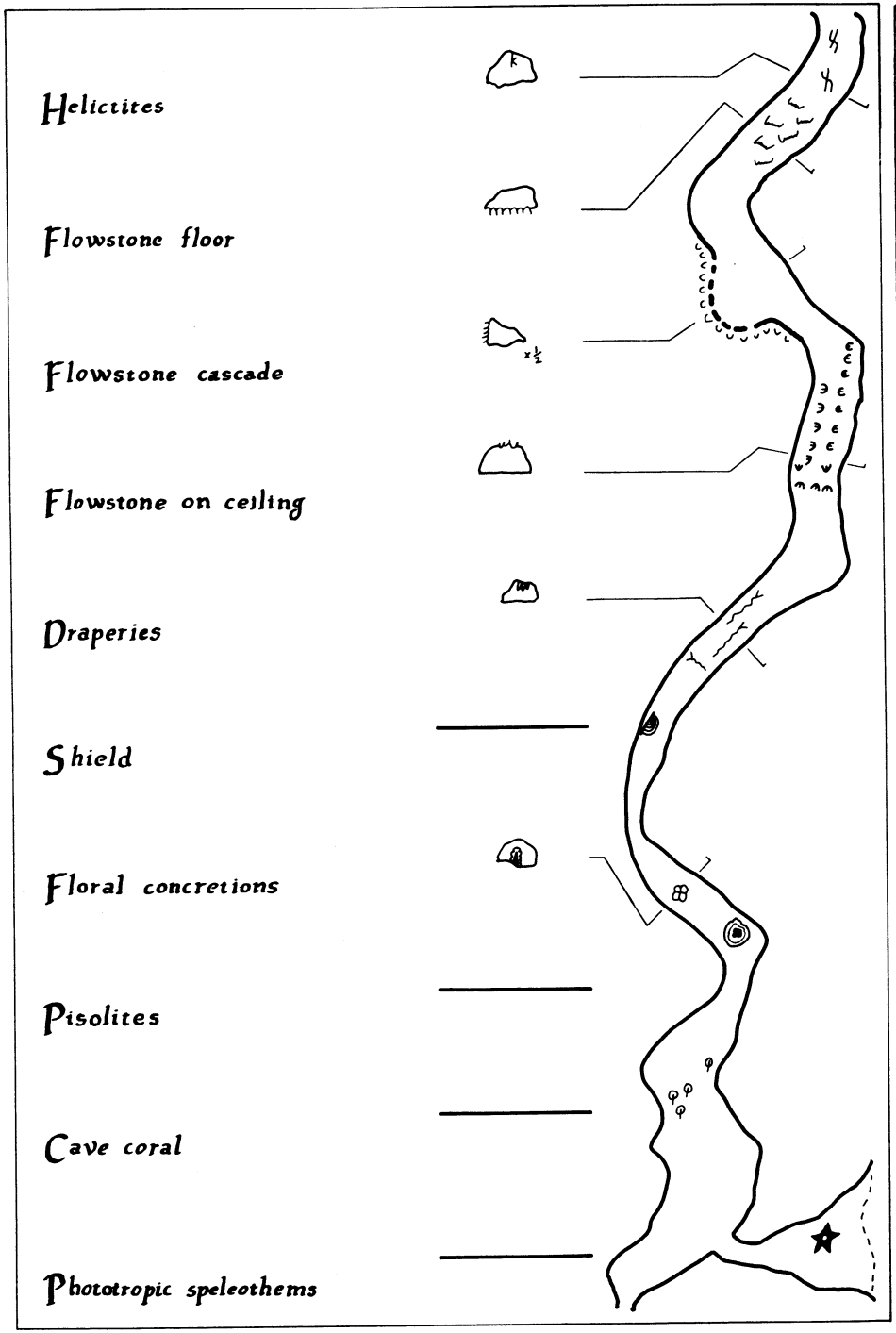
Continues, narrow

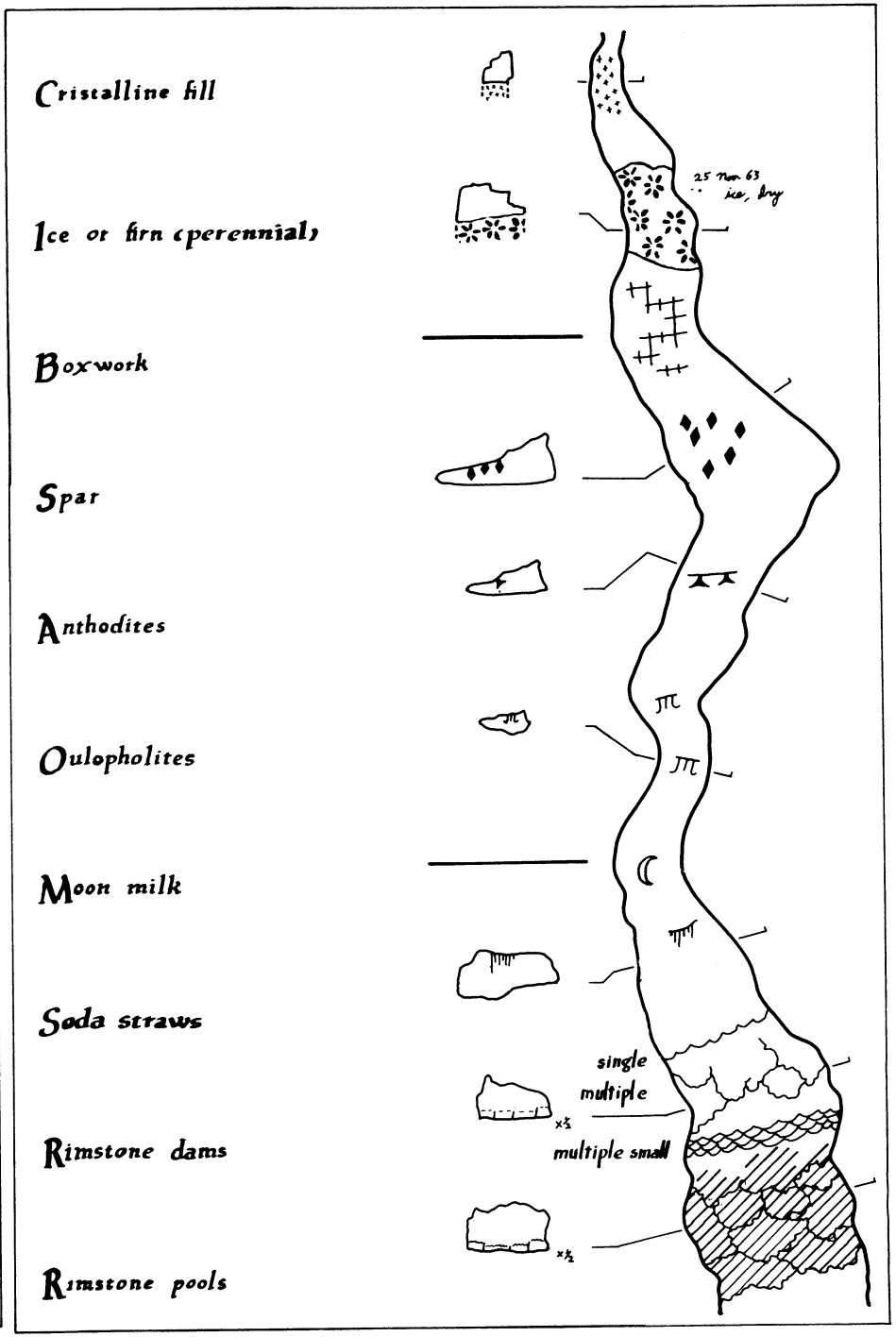
Indeterminate wall

Floor elevation ± datum

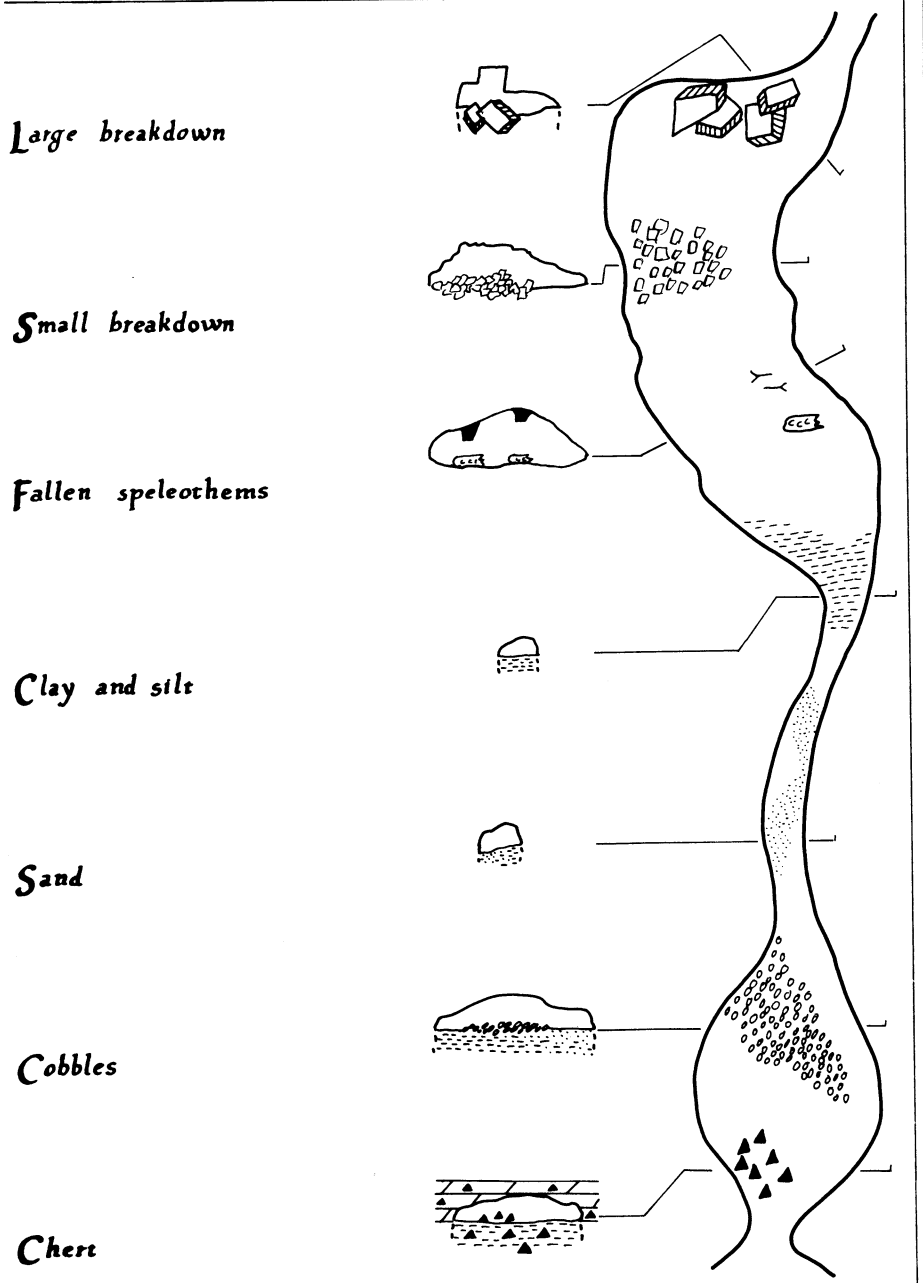
Strike and dip

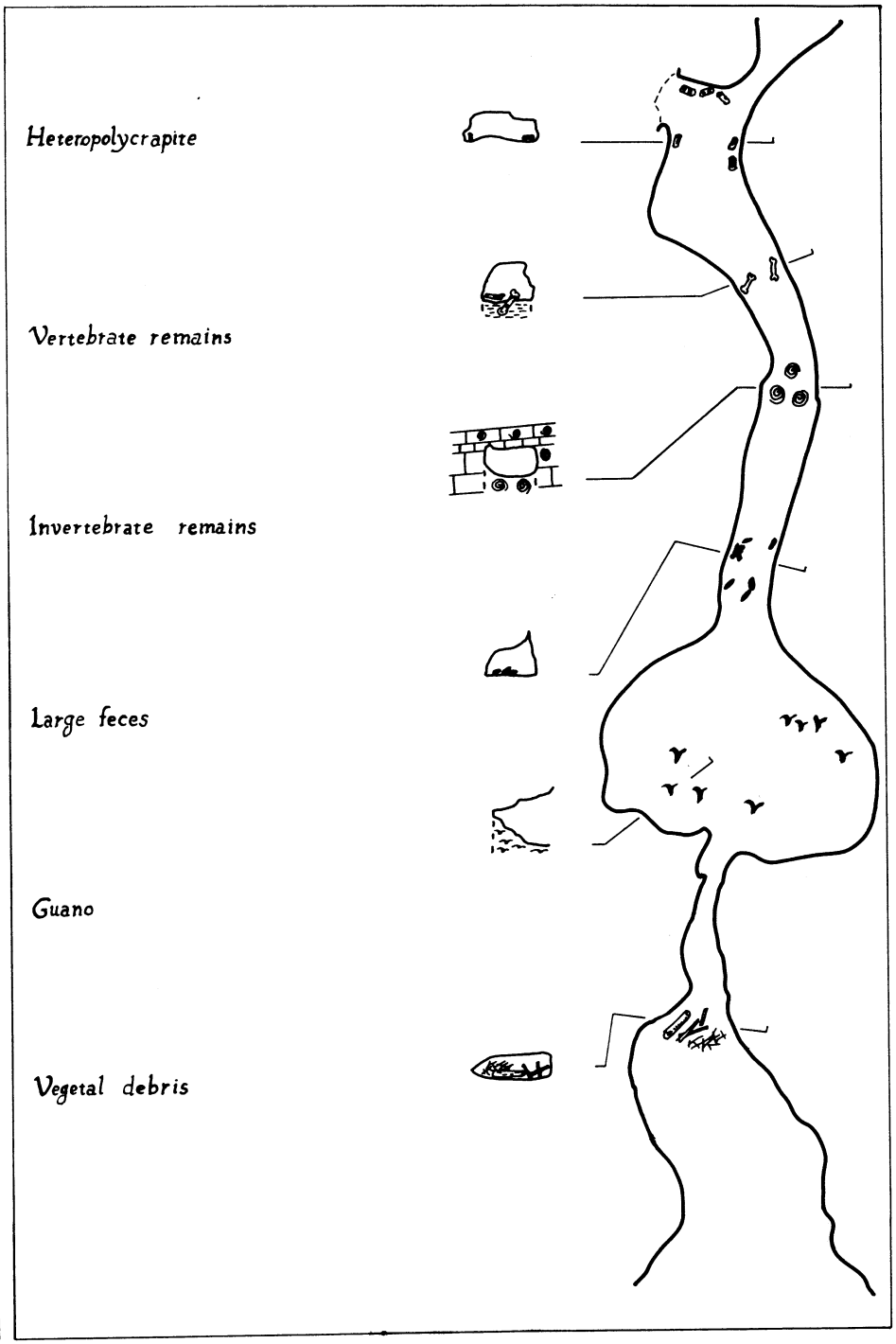



Helictites
Flowstone floor
Flowstone cascade
Flowstone on ceiling
Draperies
Shield
Floral concretions
Pisolites
Cave coral
Phototropic speleothems


Cristalline fill
Ice or firn (perennial)
Boxwork
Spar
Anthodites
Oulopholites
Moon milk
Soda straws
Rimstone dams
Rimstone pools
25 Nov 63
ice, boy
single
multiple
multiple small

SPELEOCLASTS





SPELEOGENS

Bedrock floor

Joint-controlled cavity

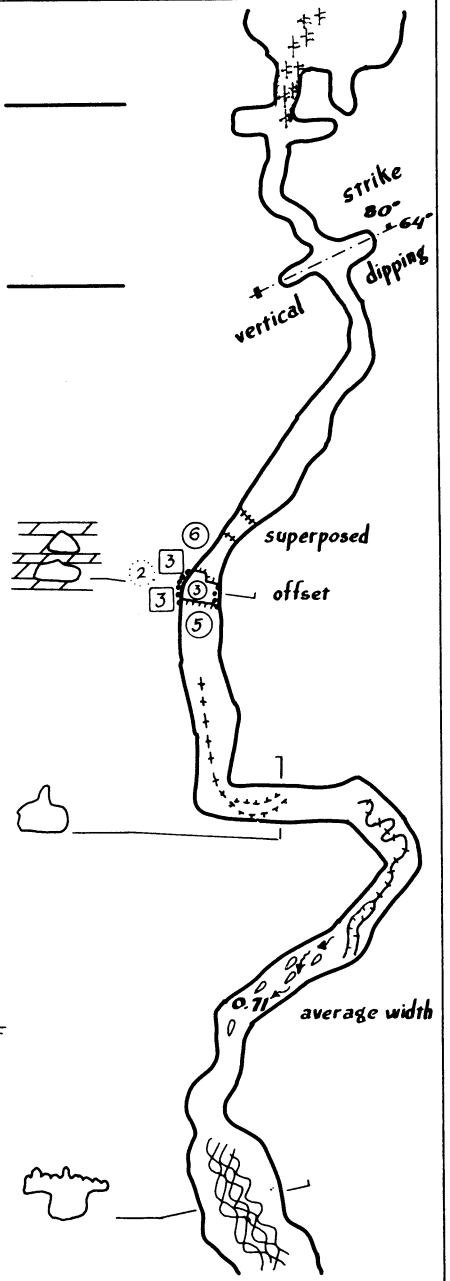
Natural bridge (bedrock)

Ceiling channel/floor slot

Scallops

specify form and flow

Anastomoses



Vertical shaft

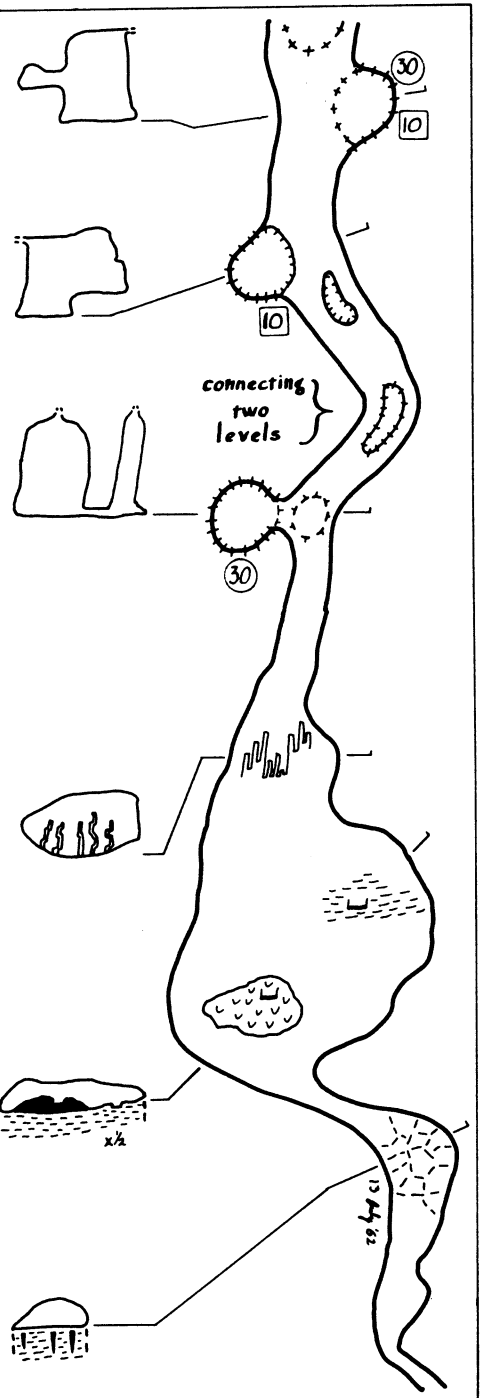
Pit

Dome

Echinoliths

Splash cups or drill holes

Mud cracks



HYDROLOGY

Intermittent stream

Small stream

Large stream

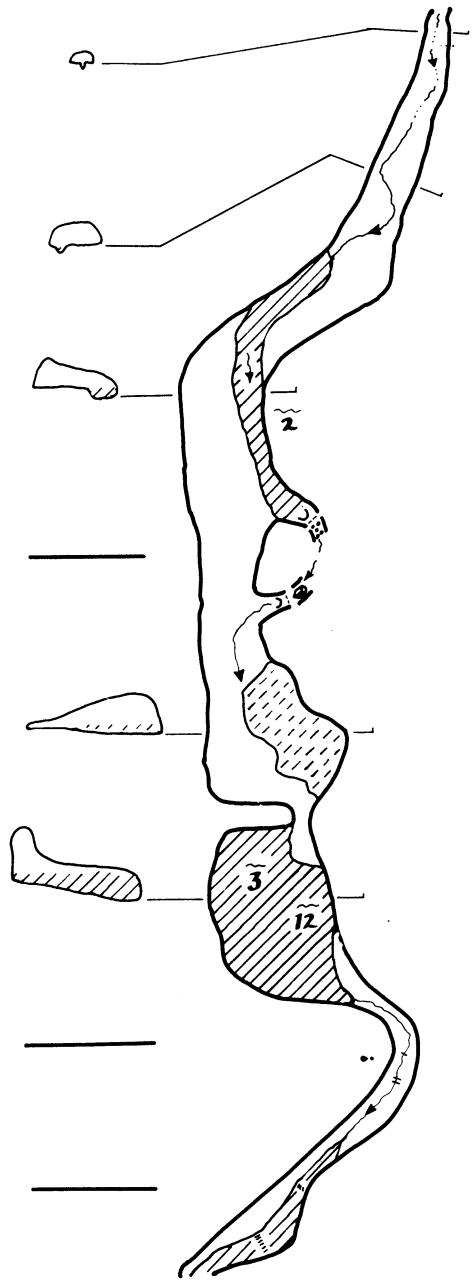
Conjectural stream

Intermittent lake

Lake, with depth

Small rapids

Large rapids



Waterfall

Submerged ceiling

Intermittent sump

Sump

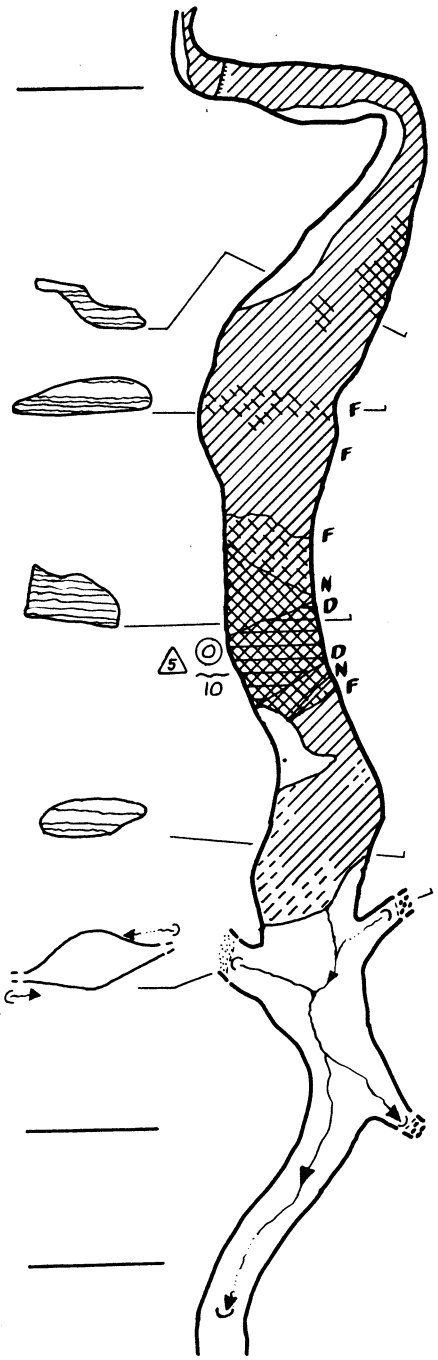
D.. DRY SEASON N.. NORMAL
F.. FLOOD STAGE

Fluctuating lake

Resurgence perennial/seasonal

Sink

Diffuse sink



Water, pure/unsafe _____

Wall seepage

Roof seepage

Current velocity _____

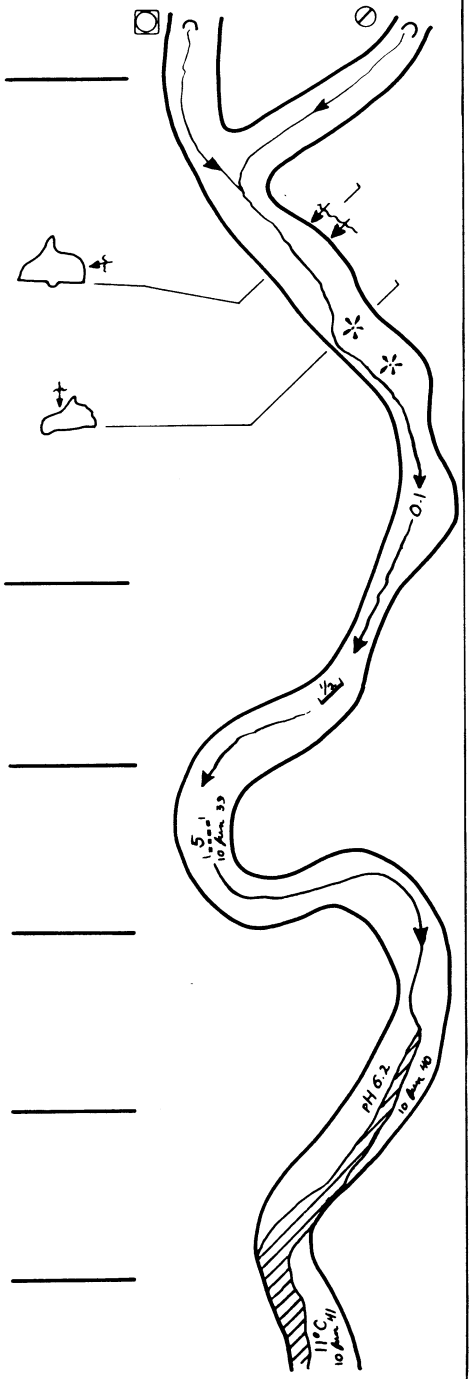
Lowest known discharge _____

name units of measurement

Highest known discharge _____

pH _____

Water temperature _____



BOTANY

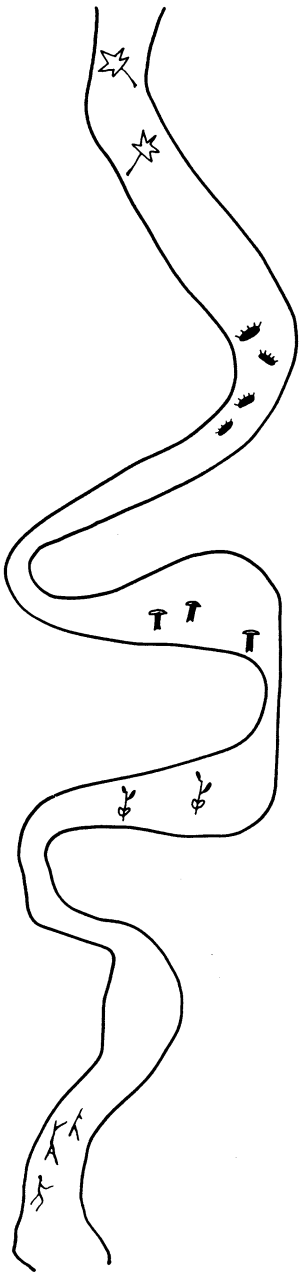
Green plants _____

Mold _____

Fungi _____

Seedlings _____

Roots _____



METEOROLOGY

Daylight limit

Thermocline

Relative humidity

Air temperature

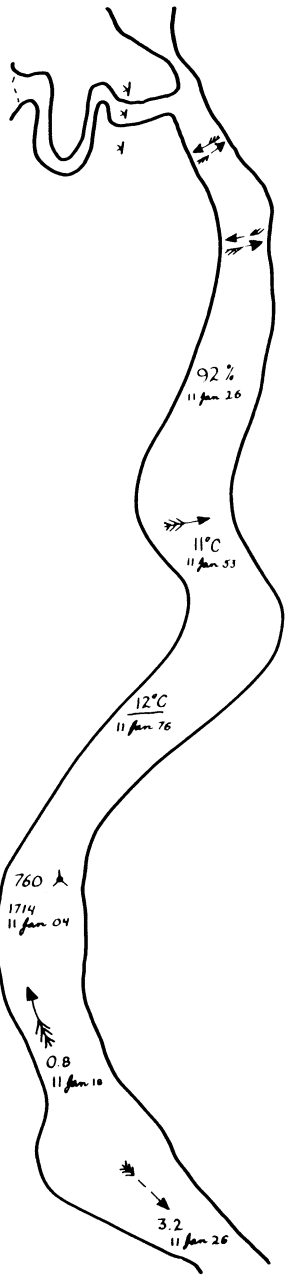
Ground temperature

Barometric pressure

Warm air current

name units of measurement

Cold air current



CULTURE

Datum

Light fixture

Marked survey station

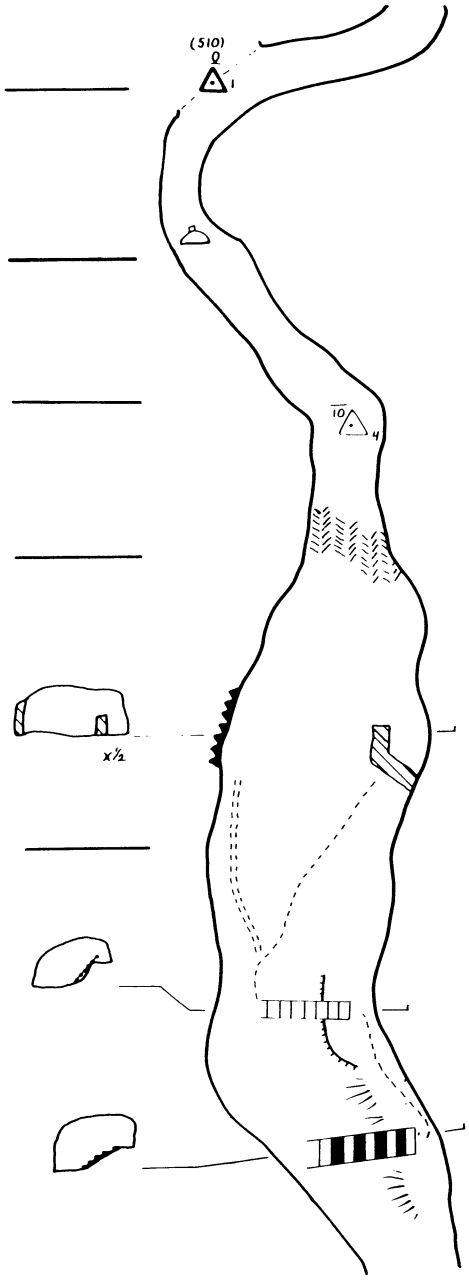
Pavement

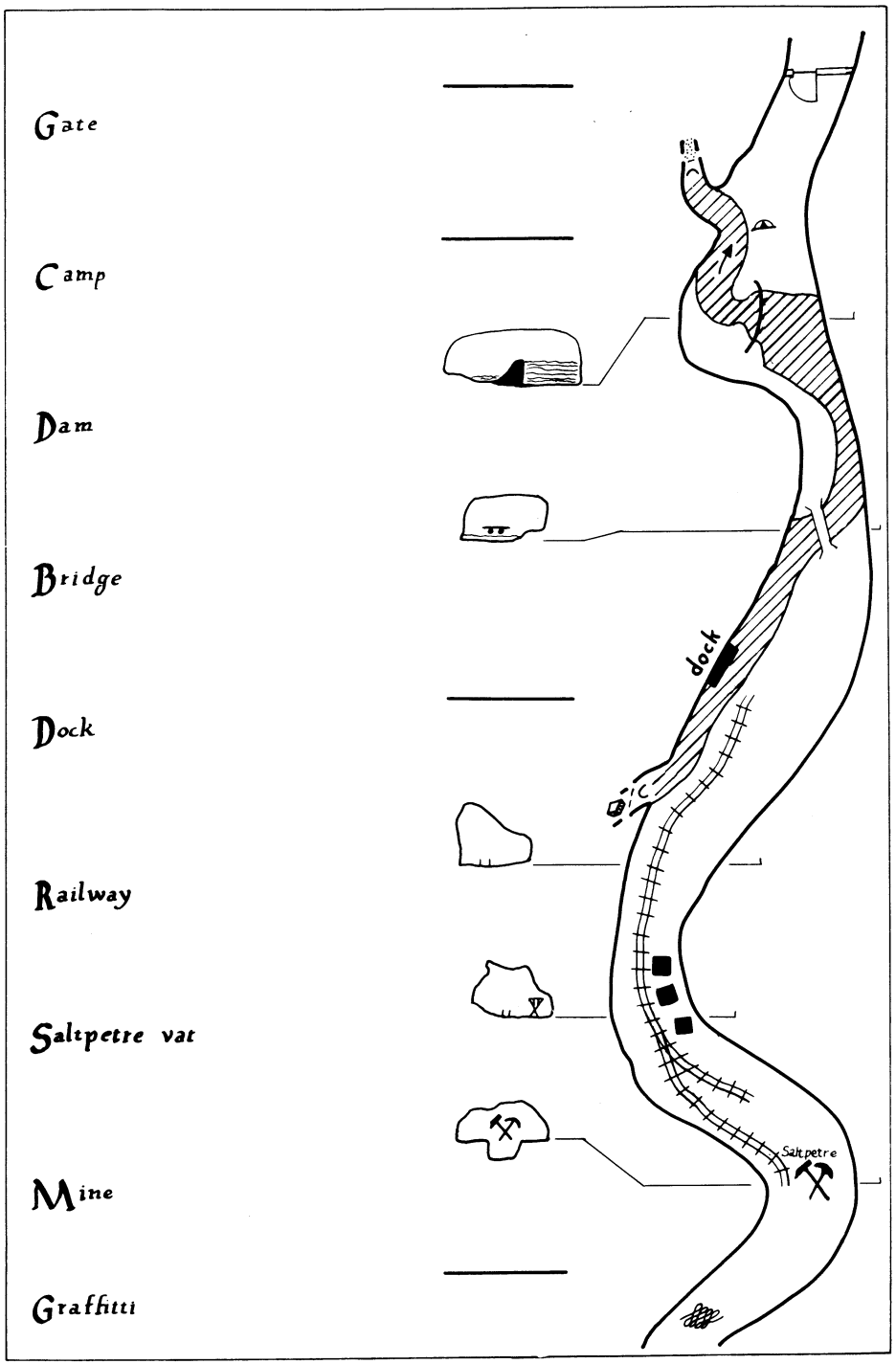
Artificial wall

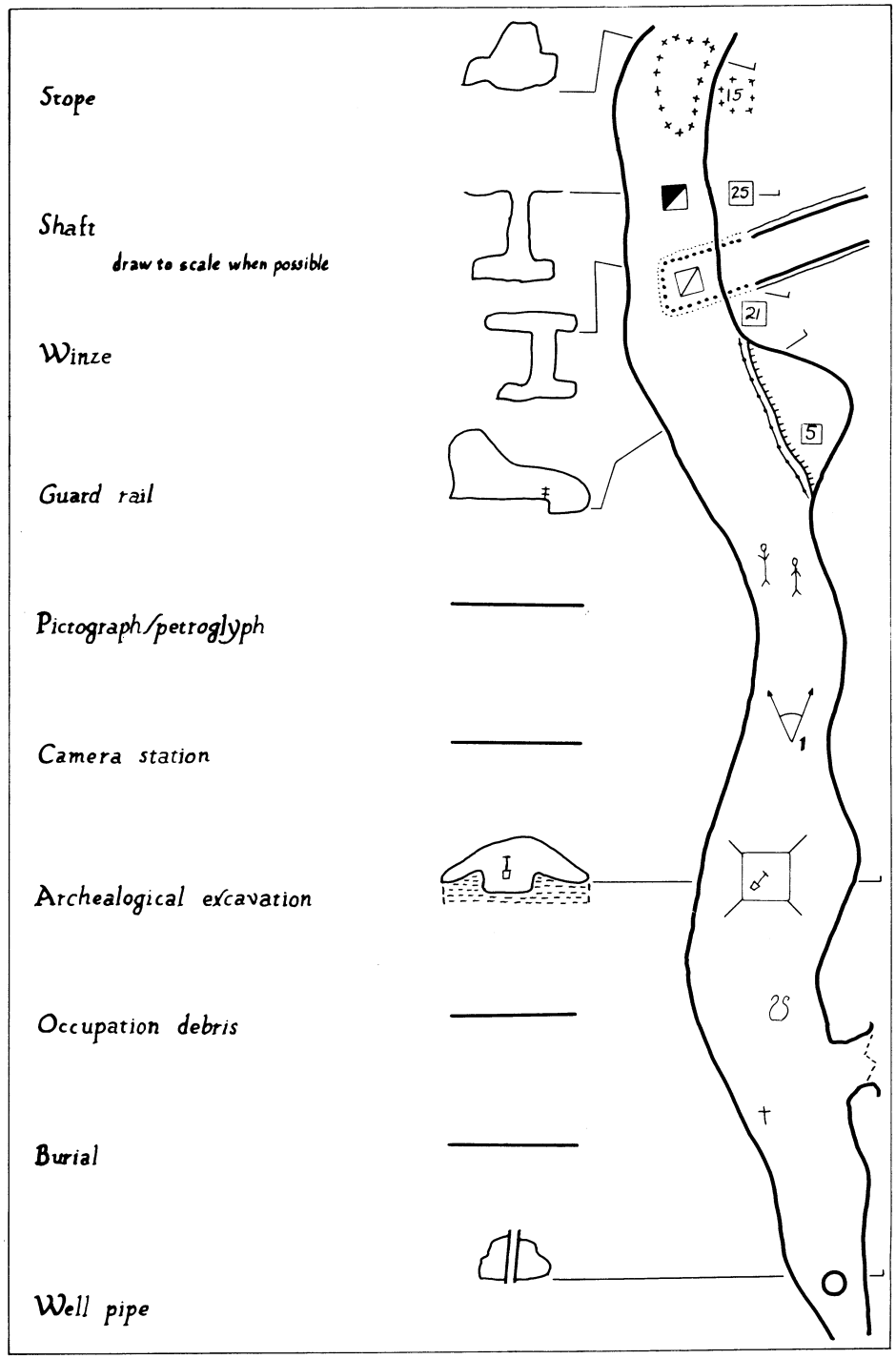
Trail, paved/unpaved

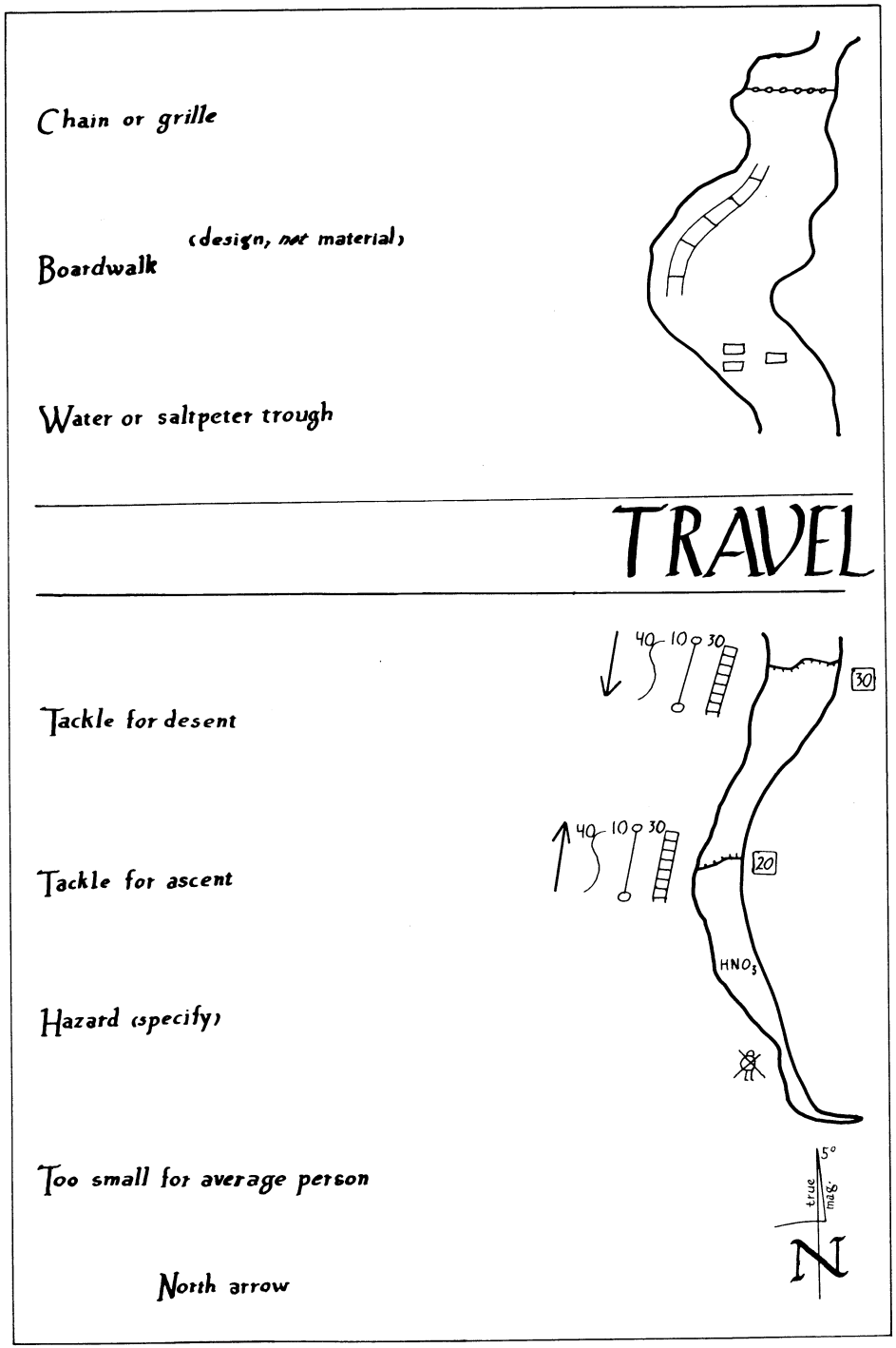
Ladder, lower end open

Stair, lower end open




Gate
Camp
Dam
Bridge
Dock
Railway
Saltpetre vat
Mine
Graffitti
dock
IC
Saltpetre


Stope
Shaft
draw to scale when possible
Winze
Guard rail
Pictograph/petroglyph
Camera station
Archealogical excavation
Occupation debris
Burial
Well pipe
15
25
21
5
1
28



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BASIC REFERENCES

Anker, T.F. and Emil Joller (1959) — Signaturen für Höhlenplane: *Stalactite* **4(2)**:25-42.

Butcher, A.L. (1962) — Cave Surveying, IN: Cullingford, C.H.D. (Ed.) — *British Caving*: London, Routledge & Kegan Paul, pp. 509-535.

Fabre, Guilhem and Maurice Audétat (1978) — Signes Spéléologiques Conventionnels: *Université des Sciences et Techniques du Languedoc, Centre d'Etudes et de Recherches Géologiques et Hydrogéologiques, Mémoire* **14**, 44 pp.

Hedges, James (1975-6) — ¿Que es lo que debe Mostrar un Mapa de Cueva?: *El Guácharo* **8-9**:66-111.

Hosley, R.J. (1971) — *Cave Surveying and Mapping*: Indianapolis, Crown, 136 pp.

Róndina, Giuliano (1958) — *Iconografia Speleologica*: Como, Rassegna Speleologica Italiana, 32 pp.

Trimmel, Hubert and Maurice Audétat (1966) — Signes Conventionnels a l'Usage des Spéléologues: *Stalactite* **16**:73-125.

SUPPLEMENTARY READINGS

anon (1951) — Signes pour la Cartographie des Cavernes: *Société Spéléo-Grèce, Bulletin* **1**:56-57.

———— (1955) — Znaki na Nacrtih Kraskih Objectov: *Acta Carsologica* **1**:Appendix.

Barbier, C.; Claude Chabert; Paul Courbon; Y. Creach; J.C. Franck; G. Marbach; M. Meysonnier; and P. Renault (1972) — (several papers): *Spelunca Bulletin* **12**:33-63.

Başar, Murat (1973) — Speleolojik Lejand: *Jeomorfoloji Dergisi* **5**:153-167.

Bini, A. and G. Cappa (1974) — Proposte di Ammodernamento della Simbologia per Rilievi di Cavità Naturali Sotterranee: *Assoc. Italiana di Cartografia, Bolletino* **31**:97-108.

———— and ———— (1974) — Proposte di Simbologia per Carte Morfologiche ed Idrologiche di Aree Carsiche a Grandissima Scala: *Assoc. Italiana di Cartografia, Bolletino* **32**:179-199.

Brod, Langford (1962) — Cave Mapping: A Systematic Approach: *Missouri Speleology* **4**:1-52.

Burkhardt, R.; P. Rysavy; M. Skoupy; and J. Vodicka (1951) — Speleokartografické Smernice: *Ceskoslovensky Kras* **4**:67-78.

Cave Research Foundation (1966) — *Flint Ridge Cave System Map Folio*: Columbus, Cave Research Foundation, 34 sheets.

Ellis, B.M. (1976) — Cave Surveys, IN: Ford, T.D. and C.H.D. Cullingford (eds.) — *The Science of Speleology*: London, Academic Press, pp. 1-10.

Fisher, John (1955) — Beckers Cave, Spider Cave, IN: Gurnee, Jeanne, (Ed.) — Annual Program Bulletin: (Northeastern Region, NSS) *NRO Report* **3**:6, 20.

Goodchild, M.F. (1969) — Stereographic Cave Mapping: *NSS Bulletin* **31**:19-22.

Götzinger, G. (1956) — Die Kartierung der Vertikaldimension der Höhlen: *Cave Committee (Vienna), 5th General Assembly, Proceedings*, pp. 6-19.

Jeannel, René and E.G. Racovitza (1918) — 6e Enumération des Grottes Visitées 1913-1917: *Archives des Zoölogie Experimentale* **57**:213-215.

Lobeck, A.K. (1924) — *Block Diagrams*: NYC, Wiley, 206 pp.

Martel, E.-A. (1894) — Les Abîmes: Paris, Delagrave, 578 pp.

Minarro, J.M. (1973) — Sobre los Mapas Karstologicos: *Simposium Espeleológico, 3°, Actos*, pp. 71-74.

Picknett, R.G. (Ed.) (1970) — Symposium on Cave Surveying: *Cave Research Group of Great Britain, Transactions* **12**:133-245.

Renault, P. (1959) — Normalisation des Signes Conventionnels en Spéléologie: *Annales de Spéléologie* **14**:267-273.

Rennie, M.A. (1965) — The Presentation of a Cave Survey: *Studies in Speleology* **1**:125-134.

Steinke, T.R. (1971) — A Vertical Contour Method of Cave Representation: *NSS Bulletin* **33**:127-134.

Stelcl, Otakar (1969) — Navrh Speleologickych Znacek pro Jeskynni Plany: *Geografiske Ustav CSAV, Zprávy* **6**:11-23.

Thompson, K.C. and Thomas Aley (1971) — Ozark Underground Laboratory, Part I: (Heart of the Ozarks Grotto, NSS) *Ozark Caver* **3(5)**:1-24.

Vineyard, J.T. (1971) — Cave Map Symbols: (Heart of the Ozarks Grotto, NSS) *Ozark Caver* **3(5)**:25-30.

White, W.B. (1966) — The Preparation of Geographic Cave Reports: *NSS NEWS* **24**:85-92.

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