

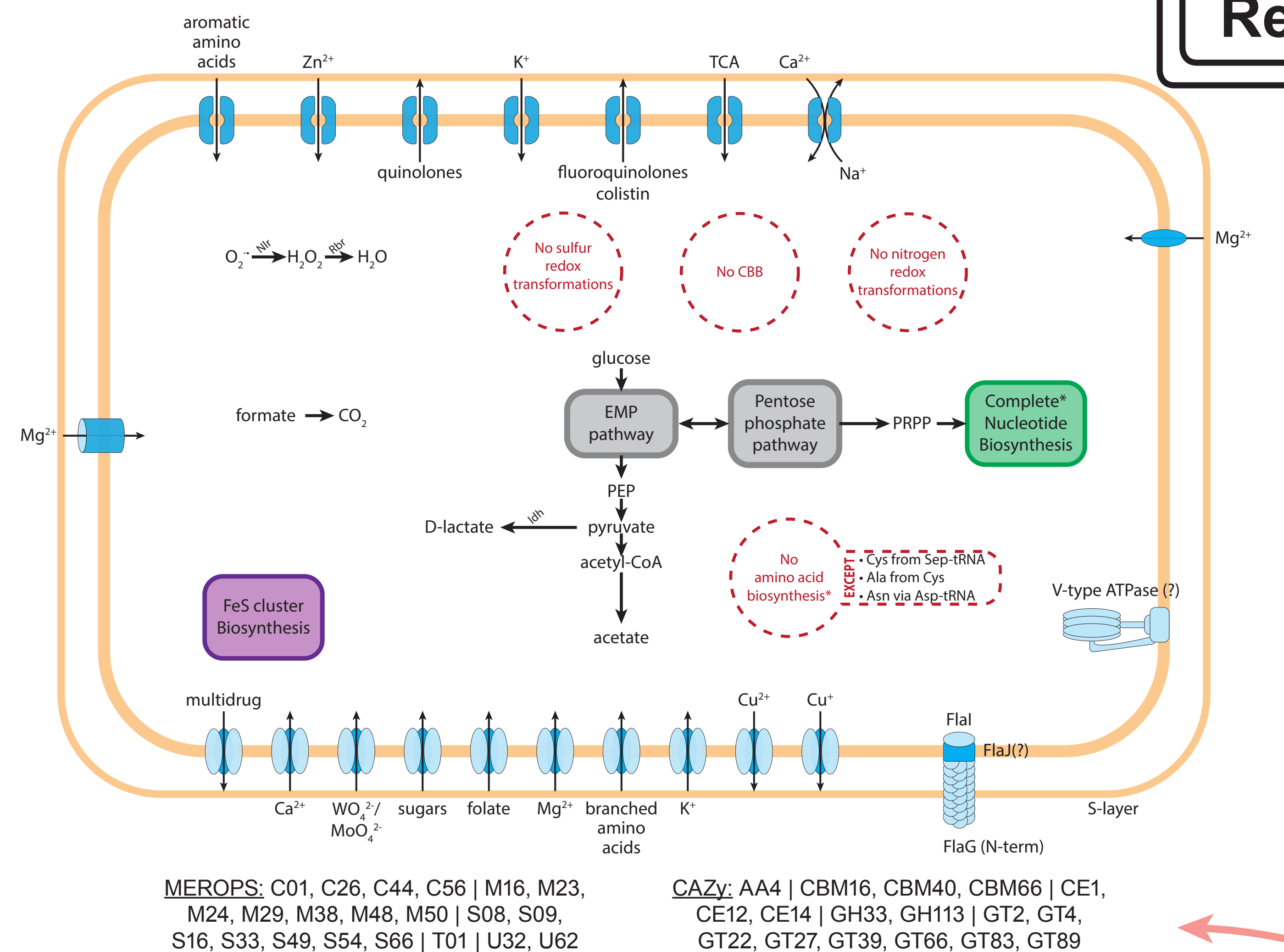
## Introduction / Motivation

- Mixed radiochemical (inc. <sup>239+240</sup>Pu and <sup>241</sup>Am) and organic/contaminated waste (steel drums, lab equipment, paper, etc.) was disposed of in shallow (3 m deep) trenches from 1960–1968.
- Previous research investigated functional and population dynamics during a rainfall event using shotgun metagenomics. This revealed a broad abundance of candidate and potentially undescribed taxa [1].

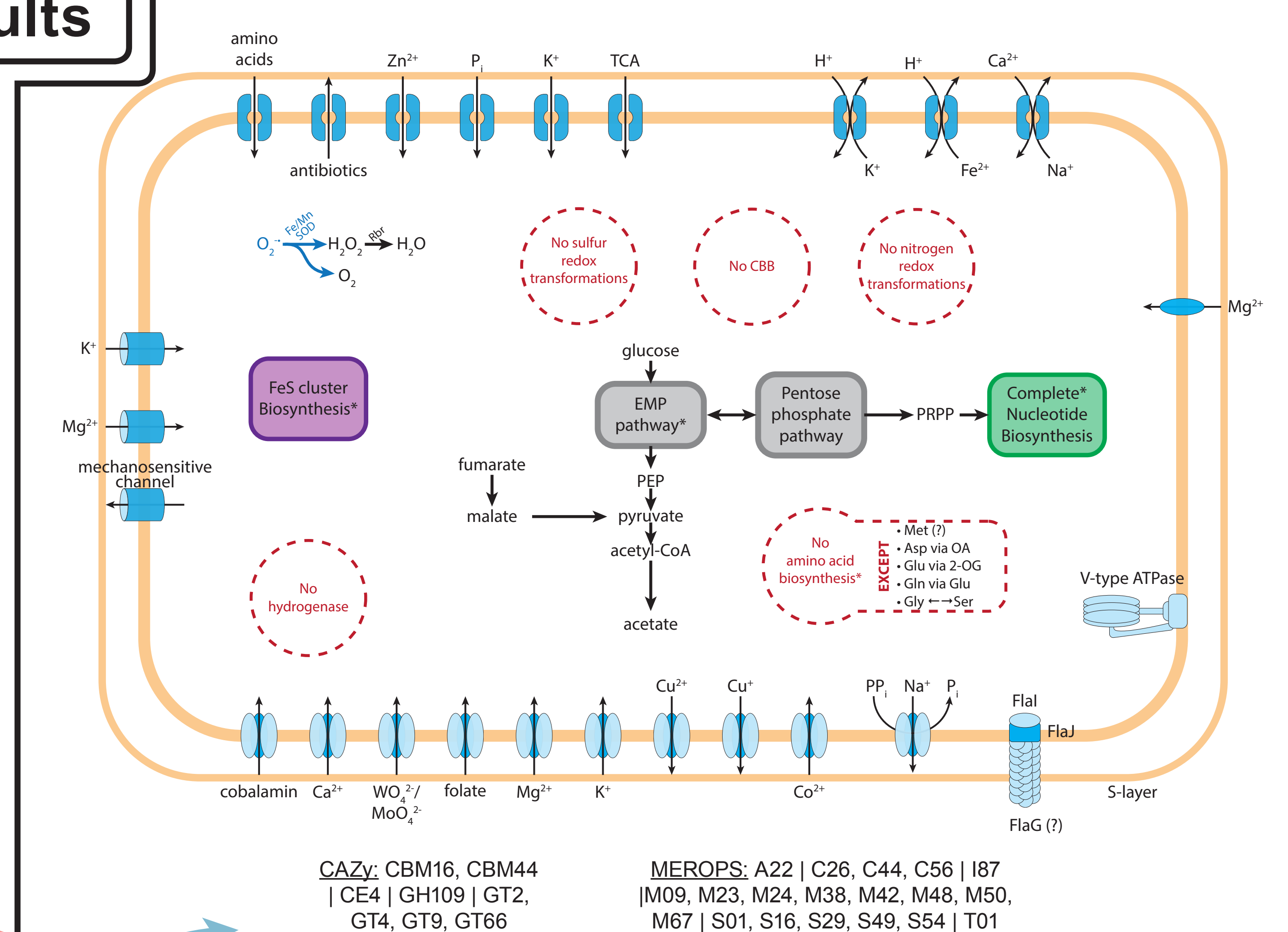
## Methods

- Assembly/Binning:** Megahit + CONCOCT + Anvi'o
- Phylogeny:** 44 concatenated ribosomal proteins (univ+arch). PMSF+C60+LG+F+I+G (IQ-TREE).
- Metabolic models:**
  - General: PathwayTools (MetaCyc) + KEGG + InterProScan + manual curation
  - Specific: dbCAN (CAZy) + MEROPS (proteases) + TCDB (transporters)

## Results



- No SOD, but neelaredoxin instead
- Formate dehydrogenase
- Facultative anaerobes or microaerophiles



- Facultative anaerobes

## LFWA-III

11 MAGs, 10 genera, 1 family

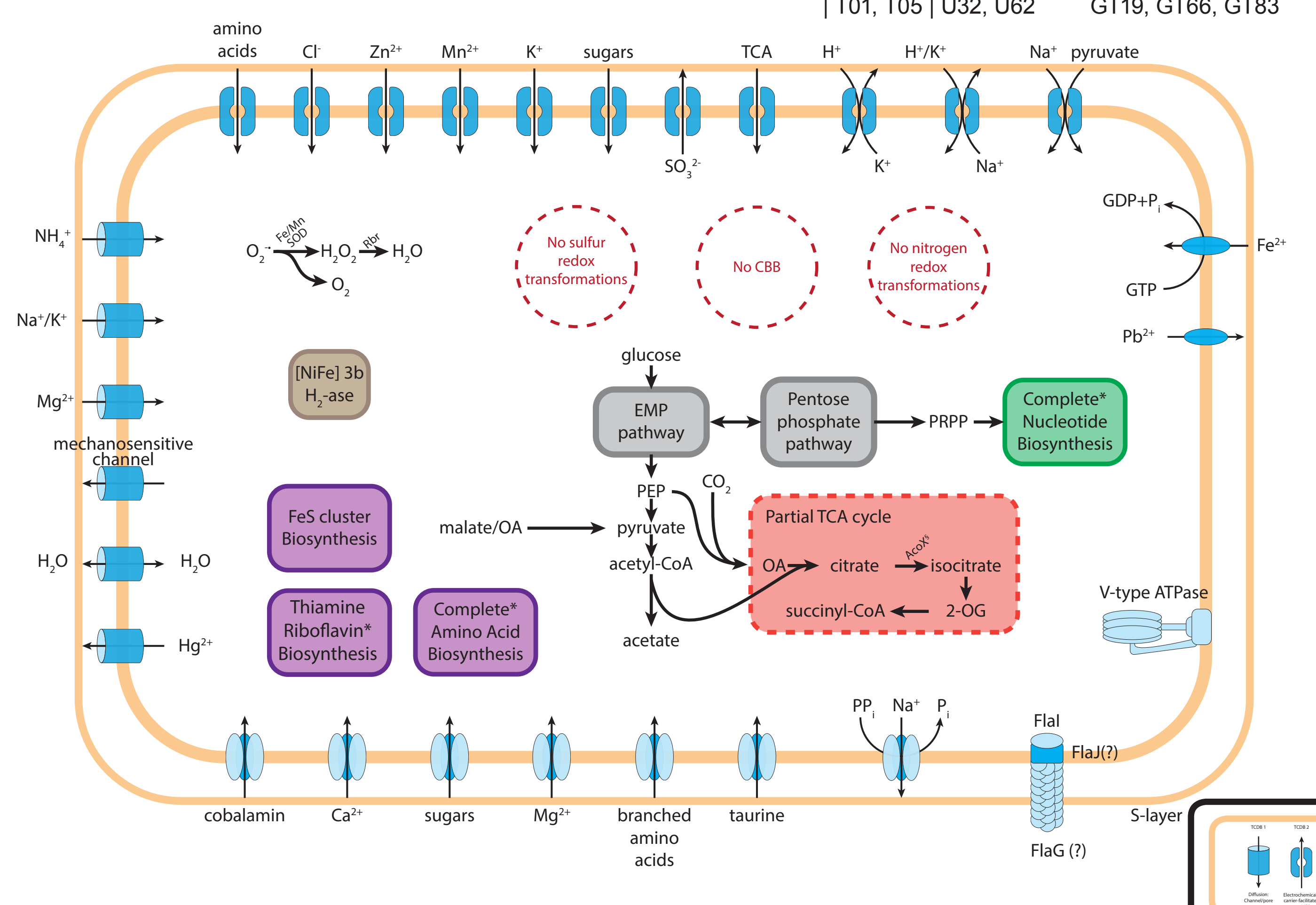
Ca. 'Gugararchaeum adminiculabundum' LFW-121\_3<sup>T</sup> CA00043

Ca. 'Wayembeharchaeum dharwalense' LFW-283\_2 [not shown] CA00042

- Facultative anaerobes or microaerophiles
- Biosynthesis of thiamine and riboflavin
- Complete *de novo* amino acid biosynthesis
- Partial TCA cycle

**Merops:** A08, A22 | C26, C44, C56, C82 | I39, I87 | M17, M20, M23, M24, M38, M48, M50, M79 | S08, S16, S33, S54 | T01, T05 | U32, U62

**CAZy:** AA6 | CBM14 | CE4 | GH23, GH91, GH109 | GT2, GT4, GT19, GT66, GT83



## LFWA-IV

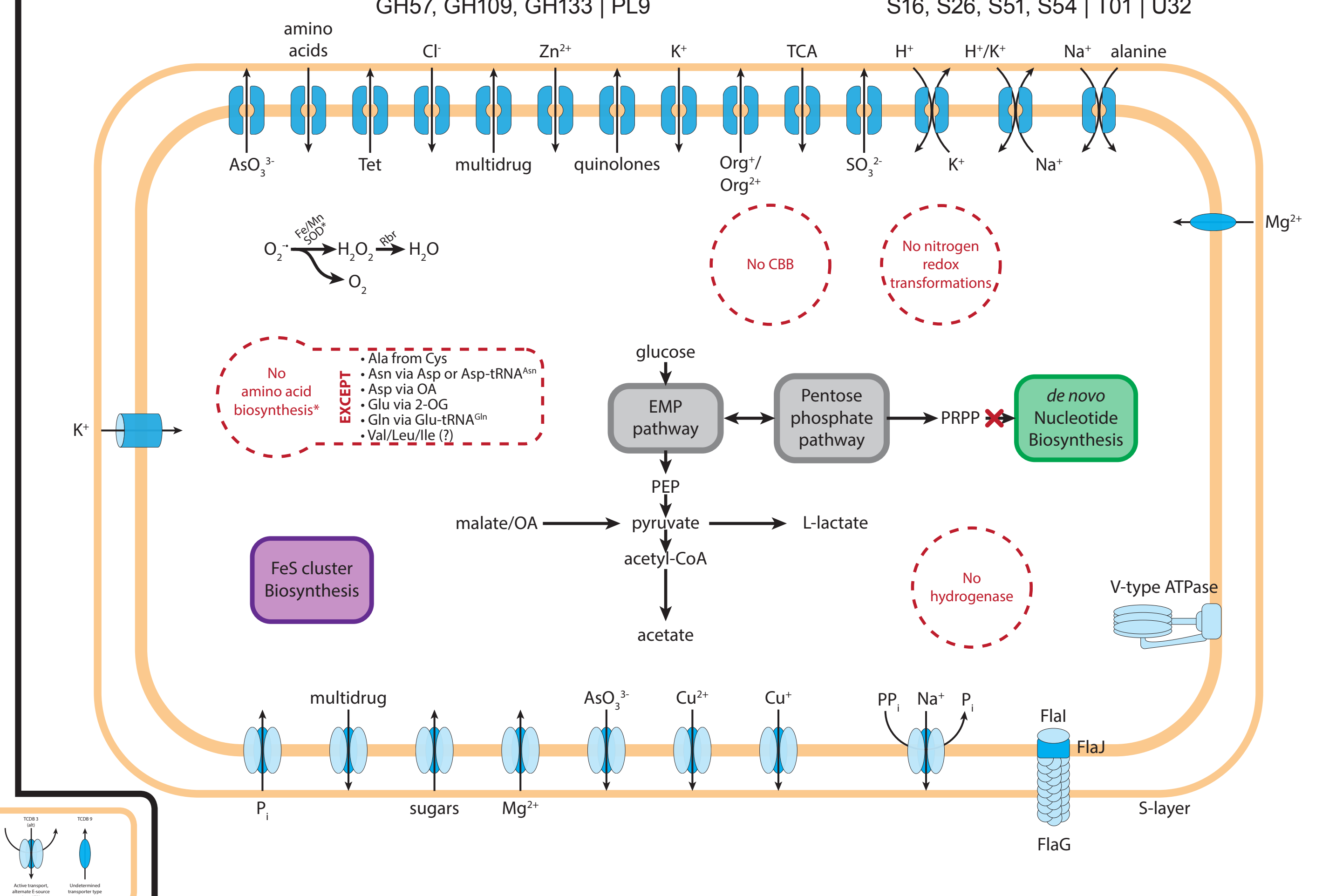
1 MAG

Ca. 'Wayembeharchaeum dharwalense' LFW-283\_2 [not shown] CA00042

- Facultative anaerobe
- High variety of antimicrobial resistance-related transporters, incl. organocations (e.g. quaternary amine detergents)
- Arsenite resistance
- Pectate lyase

**Merops:** C26, C44, C45 | I51 | M14, M20, M24, M48, M50 | S08, S09, S16, S26, S51, S54 | T01 | U32

**CAZy:** CBM16, CBM40 | CE3, CE4, CE7, CE14 | GH23, GH57, GH109, GH133 | PL9



## Contact

Xabier Vázquez-Campos  
Email: [xvazquezc@gmail.com](mailto:xvazquezc@gmail.com)  
Twitter: [@XabiVC](https://twitter.com/XabiVC)

## Conclusions

- 4 proposed new lineages in DPANN.
- LFWA-III: vitamin, aa and *de novo* nucleotide biosynthesis + partial TCA
- All able to ferment, and facultative anaero/microaerophilic.
- Rubredoxin + neelaredoxin or SOD

## References

[1] Vázquez-Campos, X. *et al.* 2017. *Appl Environ Microbiol*, 83(17), e00729. <https://doi.org/10.1128/AEM.00729-17>