

Supplementary Material

Table S1. Standardized directional selection gradients (β) and matrix of standardized quadratic and correlational selection gradients (γ) for each species complex after removing the largest individuals to avoid right skew in SL distributions (excluded: Barombi Mbo *Stomatepia* ≥ 8 cm [$n = 11$], Ejagham *Tilapia* ≥ 6 cm [$n = 48$]). β and γ were estimated in separate regressions. Quadratic selection gradients are highlighted in gray.

| Lake Barombi Mbo : <i>Stomatepia pindu/mariae</i> < 8 cm SL | | | | | | |
|--|---------|-------------------|-------------------|-------------------|--------------------------|-----------------------|
| | β | Body depth | Head depth | Jaw length | Ascending process | Orbit diameter |
| Body depth | -0.12 | -0.14 | | | | |
| Head depth | -0.03 | 0.07 | 0.04 | | | |
| Jaw length | 0.14 | -0.06 | -0.11 | 0.001 | | |
| Ascending process | 0.07 | -0.02 | 0.12 | 0.08 | -0.02 | |
| Orbit diameter | -0.11 | 0.002 | 0.05 | 0.07 | -0.06 | 0.001 |
| Lake Ejagham : <i>Tilapia (Coptodon)deckerti/fusiforme/ejagham</i> < 6 cm SL | | | | | | |
| | β | Body depth | Head depth | Jaw length | Ascending process | Orbit diameter |
| Body depth | 0.35 | 0.07 | | | | |
| Head depth | -0.01 | -0.10 | 0.07 | | | |
| Jaw length | -0.11 | -0.01 | -0.12 | -0.01 | | |
| Ascending process | -0.10 | -0.07 | 0.12 | 0.03 | -0.15 | |
| Orbit diameter | 0.03 | 0.07 | 0.07 | -0.09 | -0.04 | -0.01 |

Table S2. Standardized directional selection gradients (β) and matrix of standardized quadratic and correlational selection gradients (γ) for large (> 4.2 cm SL; $n = 400$) and small (≤ 4.2 cm SL; $n = 172$) *Stomatepia* individuals in Barombi Mbo. β and γ were estimated in separate regressions. Quadratic selection gradients are highlighted in gray.

| Lake Barombi Mbo : <i>Stomatepia pindu/mariae</i> > 4.2 cm SL | | | | | | |
|--|---------|-------------------|-------------------|-------------------|--------------------------|-----------------------|
| | β | Body depth | Head depth | Jaw length | Ascending process | Orbit diameter |
| Body depth | -0.11 | -0.26 | | | | |
| Head depth | -0.02 | 0.03 | 0.05 | | | |
| Jaw length | 0.13 | 0.04 | -0.19 | 0.04 | | |
| Ascending process | 0.04 | -0.02 | 0.13 | -0.004 | 0.02 | |
| Orbit diameter | -0.06 | -0.01 | 0.11 | 0.12 | -0.08 | -0.01 |
| Lake Barombi Mbo : <i>Stomatepia pindu/mariae</i> ≤ 4.2 cm SL | | | | | | |
| | β | Body depth | Head depth | Jaw length | Ascending process | Orbit diameter |
| Body depth | 0.17 | 0.01 | | | | |
| Head depth | -0.07 | 0.01 | -0.02 | | | |
| Jaw length | 0.08 | 0.06 | 0.05 | -0.08 | | |
| Ascending process | 0.14 | -0.03 | 0.05 | 0.12 | -0.06 | |
| Orbit diameter | -0.41 | 0.02 | 0.07 | -0.11 | -0.04 | 0.10 |

Fig. S1 BIC values comparing multivariate normal mixture models fit to the five size-corrected functional traits measured in Barombi Mbo *Stomatepia*. Models incorporate from 1-9 clusters and varying covariance structures: EII: spherical, equal volume; VII: spherical unequal volume; EEI: diagonal, equal volume and shape; VEI: diagonal, equal volume, equal shape; EVI: diagonal, equal volume, varying shape; VVI: diagonal, varying volume and shape; EEE: ellipsoidal, equal volume, shape, and orientation; EEV: ellipsoidal, equal volume and equal shape; **VEV: ellipsoidal, equal shape**; VVV: ellipsoidal, varying volume, shape, and orientation.

Fig. S1

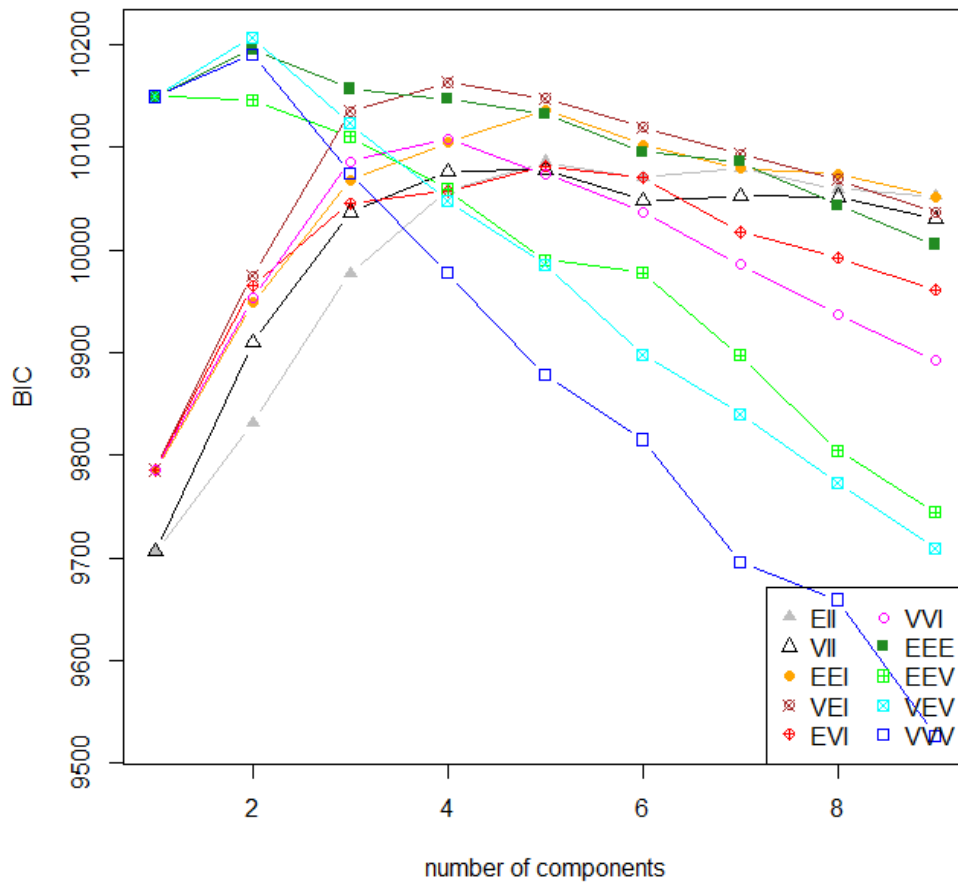


Fig. S2 BIC values comparing multivariate normal mixture models fit to the five size-corrected functional traits measured in Ejagham *Tilapia*. Models incorporate from 1-9 clusters and varying covariance structures: EII: spherical, equal volume; VII: spherical unequal volume; EEI: diagonal, equal volume and shape; VEI: diagonal, equal volume, equal shape; EVI: diagonal, equal volume, varying shape; VVI: diagonal, varying volume and shape; EEE: ellipsoidal, equal volume, shape, and orientation; EEV: ellipsoidal, equal volume and equal shape; **VEV: ellipsoidal, equal shape**; VVV: ellipsoidal, varying volume, shape, and orientation.

Fig. S2

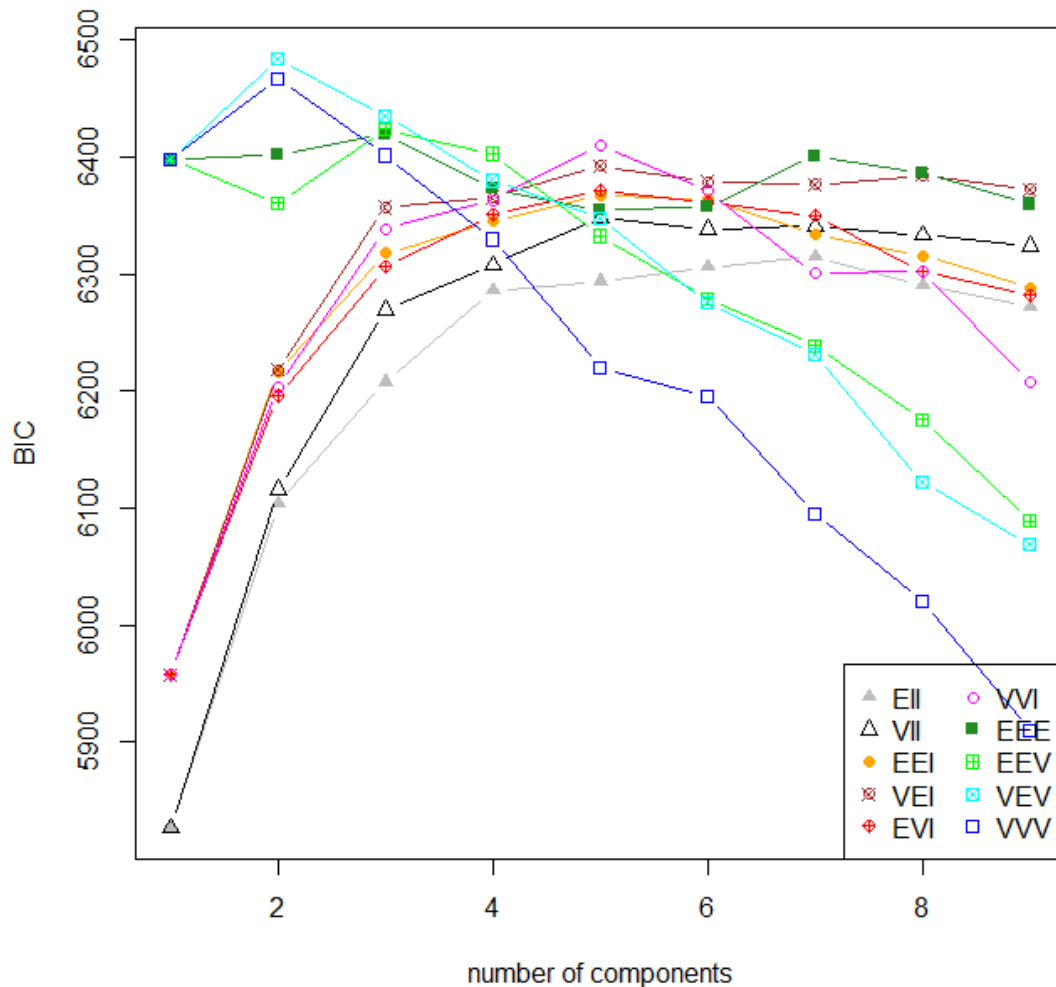


Fig. S3 BIC values comparing multivariate normal mixture models fit to the five size-corrected functional traits measured in Barombi Mbo *Stomatepia*, including an additional 76 individuals collected from 3 additional sites spanning the crater rim and all habitats within the littoral zone. Models incorporate from 1-9 clusters and varying covariance structures: EII: spherical, equal volume; VII: spherical unequal volume; EEI: diagonal, equal volume and shape; VEI: diagonal, equal volume, equal shape; EVI: diagonal, equal volume, varying shape, VVI: diagonal, varying volume and shape; EEE: ellipsoidal, equal volume, shape, and orientation; EEV: ellipsoidal, equal volume and equal shape; **VEV: ellipsoidal, equal shape**; VVV: ellipsoidal, varying volume, shape, and orientation.

Fig. S3

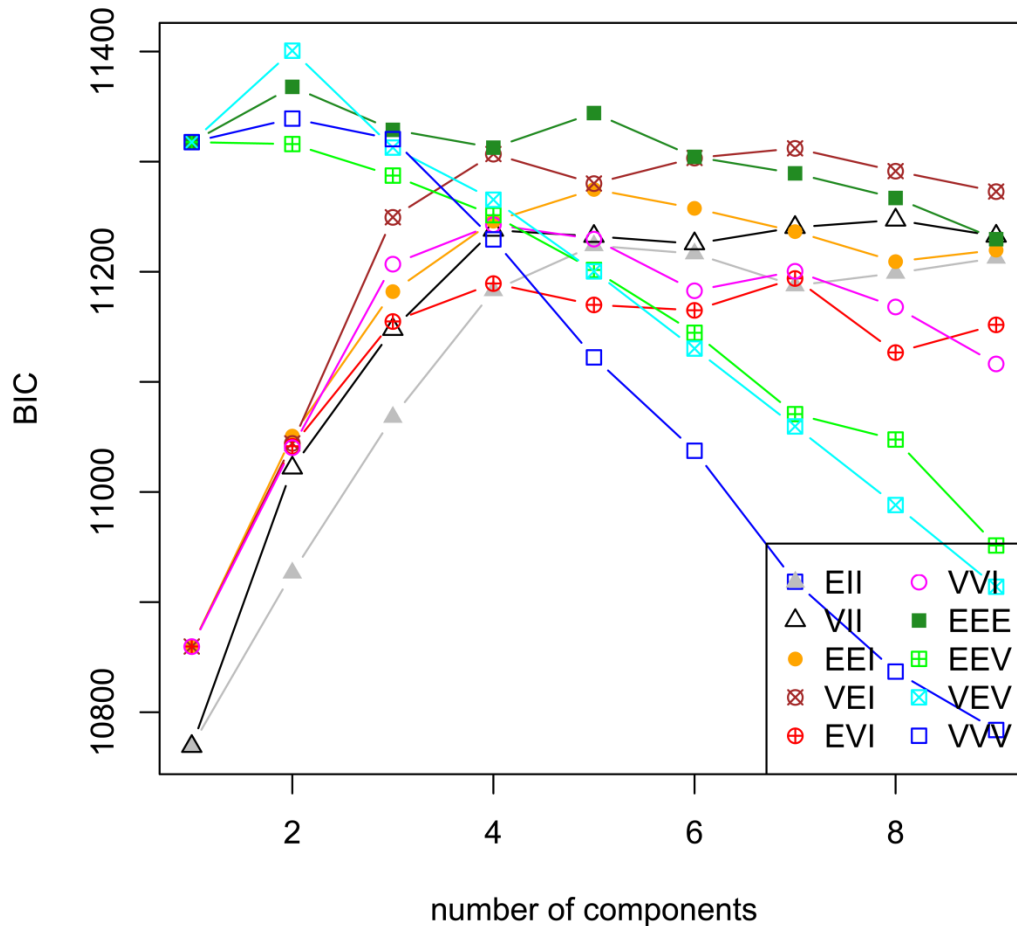


Fig. S4 Biplots depicting cluster assignment in the preferred model with two ellipsoidal clusters of equal shape (blue triangles and red squares) fit to the five size-corrected functional traits measured in Barombi Mbo *Stomatepia*.

Fig. S4

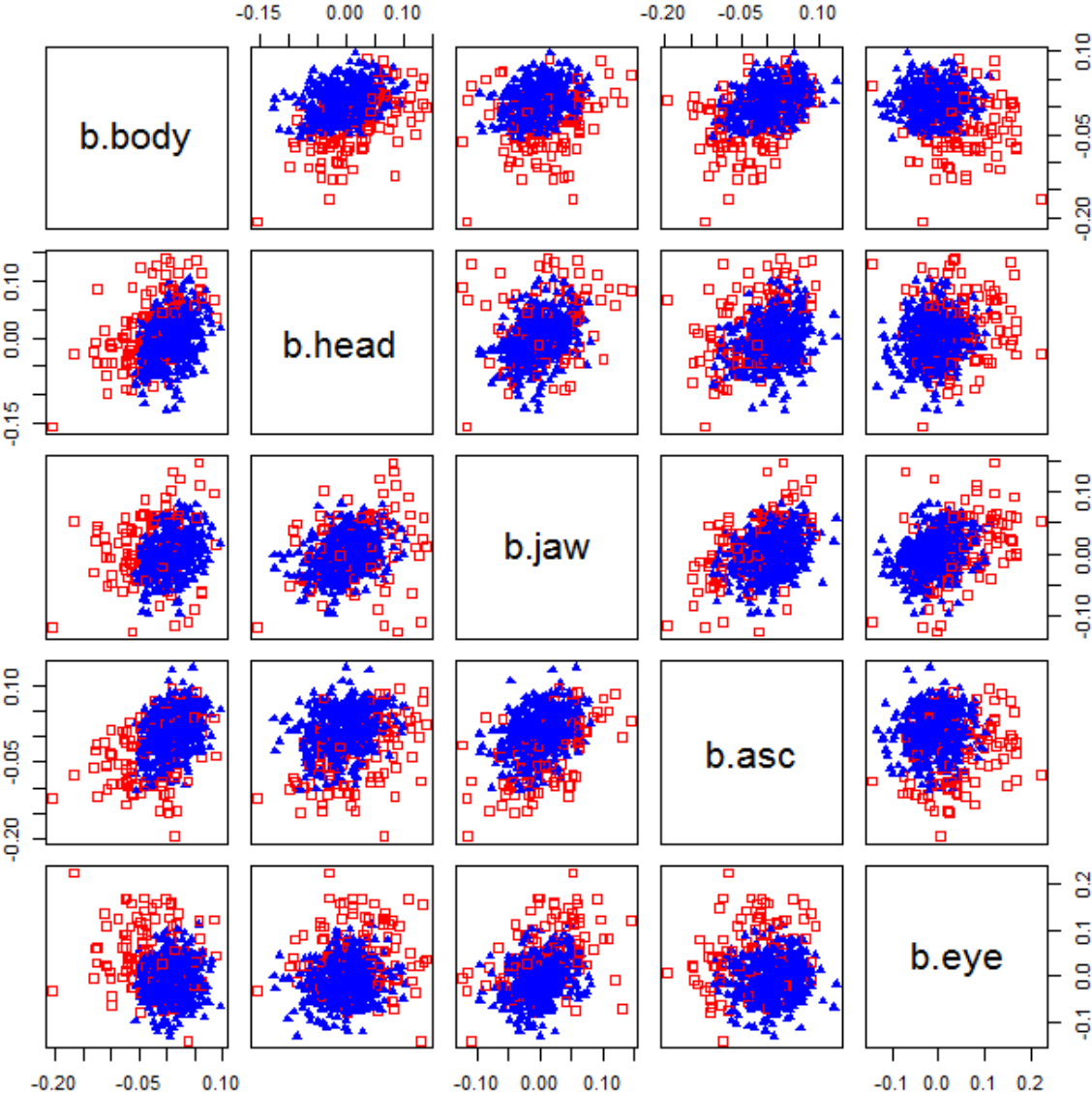


Fig. S5 Biplots depicting cluster assignment in the preferred model with two ellipsoidal clusters of equal shape (blue triangles and red squares) fit to the five size-corrected functional traits measured in Ejagham *Tilapia*.

Fig. S5

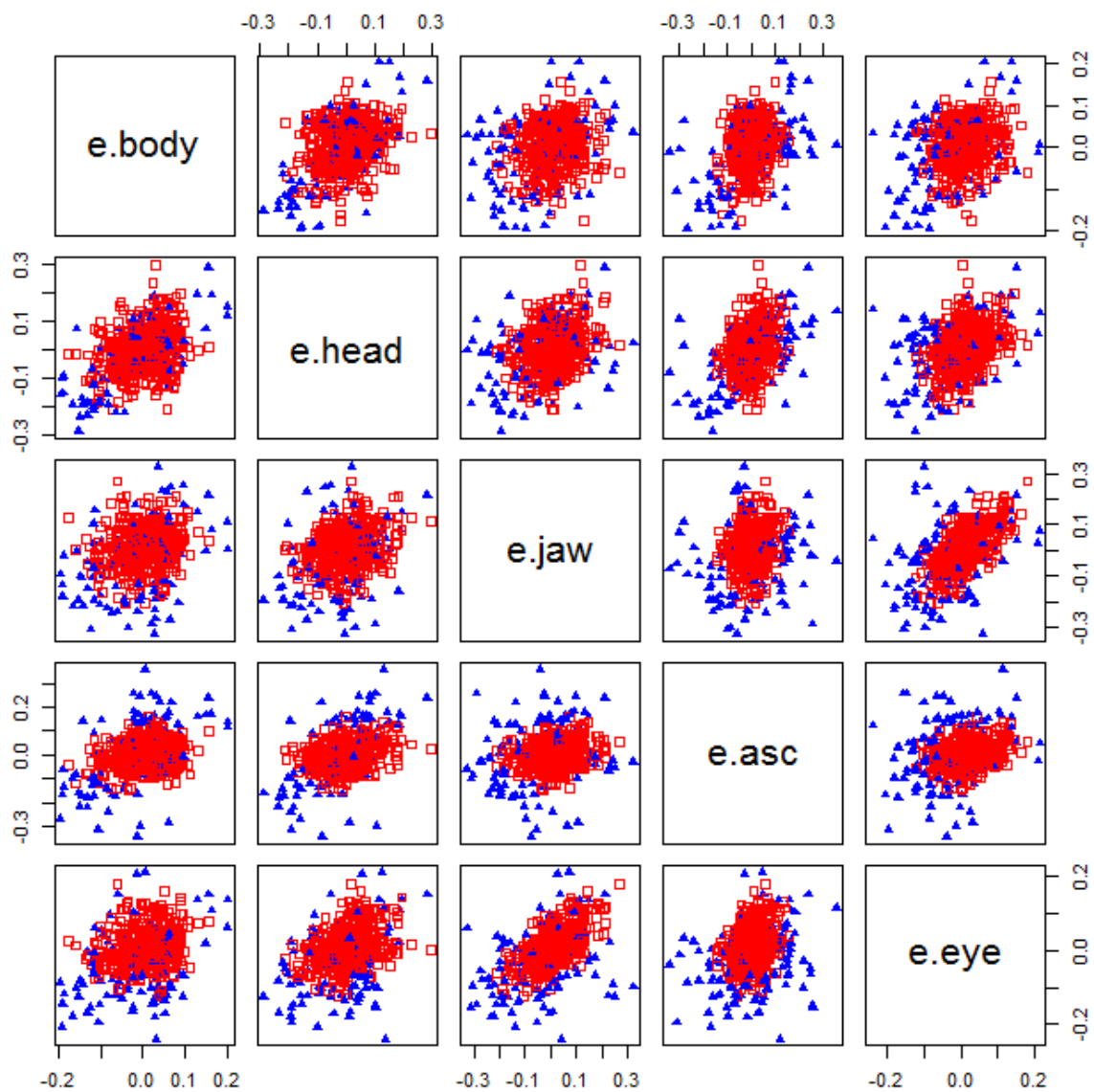


Fig. S6 Histograms of Bayesian cluster assignment for all traits measured in Barombi Mbo *Stomatepia* (a-e) and Ejagham *Tilapia* (f-j). Overlapping histograms correspond to cluster assignment in the best model of two ellipsoidal clusters of equal shape for each species complex. Traits were size-corrected by taking the residuals from a linear regression of log-transformed trait on log-transformed SL, performed separately for each species complex.

Fig. S6

