The Four Pillars of Ethnopharmacology

All manuscripts submitted to the specialty section Ethnopharmacology must follow the best-practice assessment criteria defined as “The Four Pillars of Ethnopharmacology” to being considered for peer review. See them below:

### 1. Pharmacological Requirements

a) *Traditional context* - The traditional context must be described in the introduction.

b) There must be clear evidence (based on a review of the published literature) for the novelty of this study

c) *Credible experimental models* - methods must be state of the art, or a credible alternative. The following have specific requirements:

<table>
<thead>
<tr>
<th>Category</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antioxidant</td>
<td>- FRAP, ABTS, DPPH, and Trolox equivalent antioxidant capacity assays are not accepted as evidence for pharmacological effects</td>
</tr>
</tbody>
</table>
| Antimicrobial             | - Disc diffusion experiments must be followed by *in vitro* or *in vivo* experiments  
- Specificity must be assessed to rule out general toxic effects, e.g. by including parallel cytotoxicity testing ([cf. Cos et al. 2006](#))  
- The mechanism of action must be assessed in sufficient detail (for crude extracts, the effects of contaminants should also be addressed) |
| Inflammation              | - Experiments on the rat hind paw oedema model are not acceptable unless they are part of a larger pharmacological – phytochemical study                                                                           |
| Docking studies           | - These will not be accepted unless followed by benchwork confirming affinity.  
- A proposed mechanism of action is required.                                                                                                           |
| *In silico* network pharmacology studies | - Network pharmacology studies must critically assess the evidence to evaluate the potential pharmacological effects of a preparation / herbal (medical) product  
- The identification of the compounds must be sound. This information may be derived from the existing literature or from an isolation step. It is essential that the quantities of the compounds in the preparation or plant are stated and are high enough to be of pharmacological relevance  
- The bioavailability of the compounds must be assessed  
- Ubiquitous or very widely known compounds are highly unlikely to be “active”  
- Transcriptomic data need to be validated using RT-PCR, and proteomic data with Western blots |
| Single dose studies       | - These are not accepted unless they focus on a species / compound not yet studied in detail, and can be justified on specific ethical grounds                                                                 |

d) *Dose* - ranges must be therapeutically relevant.

- Implausibly high doses will not be considered.
- Both positive and negative controls are essential.
- Multiple doses are strongly recommended, as single dose studies are rarely accepted - only in some specific complex models.

Also, see [here](#) the general requirements for phytopharmacological research adopted by the leading journals in the field.
2. Requirements Specific to the Composition of the Preparation

General: Whether the material under investigation is a crude plant extract, a multi-herbal preparation, a single compound from a commercial source or extracted from plant, chemical and botanical composition must be explicitly stated.

a) Chemical:

- The concentrations of the main metabolites must normally be included, including dominant impurities if these compounds have been identified in previous studies. Stating the class of compounds present (such as “alkaloids”) is insufficient. We will usually ask for a HPLC or UPLC to establish the compounds present to ensure replicability, if this is not possible a credible alternative like the drug-extract ratio may be used.

- Referring to a previously used preparation in the literature is not acceptable, unless it has come from the same preparation or has the same batch number.

- For purchased compounds, purity (%) and the supplier name must be included.

- For extracted compounds, purity (%) and the method used to determine the purity must be stated.

- The structure of active compounds should be included as figures unless these are widely distributed compounds.

b) Botanical:

- All species names must be fully validated using preferably the Kew Medicinal plant names service and the full and valid species name must be included. Drug names should be included, if applicable.

  If a multi herbal preparation is used, the concentration or ratio of the botanical drugs or extracts must be specified.

- Samples must be deposited in a recognised herbarium / collection, and accessible if necessary. To find out if your institution is indexed, please use the NYBG Steere Herbarium Search tool.

- Voucher numbers from the herbarium must be included in the Methods.

- Coordinates of plant collection sites should also be included, or the commercial source of a preparation, which must include a batch number and details on the preparation’s composition.

- The same rules apply to samples of animal or fungal origin

3. Basic Experimental and Ethical Requirements

a) The study must contribute substantially to the existing literature. How it does so must be explicitly stated. The most up-to-date surrounding literature should be discussed, including related compounds, to demonstrate the contribution of the study to the field.

b) Compliance with all international ethical standards is essential. The Convention on Biological Diversity and the Nagoya Protocol are of particular relevance. This includes that research in the field should benefit the original users and consider their traditions.

c) The use of animals must be justified. If a material is well-characterised, and its properties well-known, performing another in vivo study is considered an unethical use of animals. A thorough knowledge of the literature is essential to avoid this mistake. Conversely, if a material is not well characterised, initial experiments in cell-based models are necessary to justify moving onto animal experiments.

d) The effects of traditional medicinal preparations must be testable in scientific terms. We acknowledge the importance of the understanding of medicinal preparations in their cultural context, and it may be that the treatment of symptoms as defined by traditional practices forms a basis for such investigations. However, pharmacological studies generally do not provide evidence for such uses, but rather for the established therapeutic targets of the model. Experimental outcomes
should be linked to and described in these terms. For example, a series of in vitro tests will not demonstrate relevant evidence that will contribute to a physiological understanding of traditional therapeutic concepts, e.g. “dispelling wind” or “dampness” in Traditional Chinese Medicine. A justification must therefore be given for choosing a certain model to test a certain preparation.

4. Article-type Specific Requirements

a) FIELD STUDIES
   • Data must be substantial and original.
   • The study must be discussed in the context of previous studies carried out in the region. How the study contributes to the development of the field must be made explicit.
   • Must comply to the ConsEFS standards, including any updates.

b) REVIEWS
   • The objective of the review must be clearly defined.
   • They must provide a specific, critical assessment of the literature. The scientific quality of the original articles must be critically assessed. This includes the experimental design, and reliability of the studies.
   • The traditional use must be linked to scientific evidence.
   • Future needs and priorities must be clearly defined.

c) SYSTEMATIC REVIEWS & META ANALYSES
   • To assure the quality of the studies included, we ask for the inclusion of a summary table (templates below).
   • We ask that a chemical analysis is included, taken from one of the included studies. The chemical composition of the study material must be well defined. If the composition is poorly characterised, this must be highlighted.
   • Quality control measures taken, as defined by a pharmacopoeia, must also be included.
   • If the included studies do not use full botanical taxonomic names, this should be highlighted, as must any naming inconsistency between studies.

***See tables on the next page***
### Option 1 – Botanical or multiherbal

<table>
<thead>
<tr>
<th>Study</th>
<th>Species, source, concentration</th>
<th>Quality control reported? (Y/N)</th>
<th>Chemical analysis reported? (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X et al. (2015)</td>
<td>Leaf of <em>Azadirachta indica</em> A.Juss., [Commercial Supplier Ltd], 8.5g</td>
<td>Y - Prepared according to x pharmacopeia</td>
<td>Y - HPLC</td>
</tr>
<tr>
<td></td>
<td>Root of <em>Vincetoxicum auriculatum</em> (Royle ex Wight) Kuntze [coordinates of the collection site(s)], 7.2g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y et al. (2016)</td>
<td>Dried roots of <em>Panax ginseng</em> C.A.Mey., [Commercial Supplier Ltd] 7.2g</td>
<td>Y - Leaves ground and filtered...</td>
<td>Y - HPLC</td>
</tr>
</tbody>
</table>

### Option 2 – Patented formulations, botanical or chemical

<table>
<thead>
<tr>
<th>Study</th>
<th>Formulation</th>
<th>Source</th>
<th>Species, concentration</th>
<th>Quality control reported? (Y/N)</th>
<th>Chemical analysis reported? (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X et al. (2015)</td>
<td>[name of preparation]</td>
<td>[Commercial Supplier, Ltd.]</td>
<td>Leaf of <em>Azadirachta indica</em> A.Juss., 8.5g</td>
<td>Y - Prepared according to x pharmacopeia</td>
<td>Y - HPLC</td>
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<td></td>
</tr>
<tr>
<td>Y et al. (2016)</td>
<td>[name of preparation]</td>
<td>Prepared by Y et al. (2016)</td>
<td>Leaf of <em>Azadirachta indica</em> A.Juss., [Commercial Supplier Ltd], 8.5g</td>
<td>Y - Prepared according to x pharmacopeia</td>
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<td></td>
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</tbody>
</table>

### Option 3 – Isolated chemical compound

The purity must be stated unambiguously

<table>
<thead>
<tr>
<th>Study</th>
<th>Compound, concentration</th>
<th>Source</th>
<th>Purity (%) (and grade, if applicable)</th>
<th>Quality control reported? (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X et al. (2015)</td>
<td>Pure compound, 10mg</td>
<td>[Commercial Supplier]</td>
<td>(≥90%)</td>
<td>Y</td>
</tr>
<tr>
<td>Y et al. (2016)</td>
<td>Pure compound, 10mg</td>
<td>Purified by Y et al. (2016)</td>
<td>(≥90%)</td>
<td>Y - HPLC</td>
</tr>
</tbody>
</table>