

## Supplementary Material

Review

# Biodiversity of Secondary Metabolites Compounds Isolated from Phylum Actinobacteria and Its Therapeutic Applications

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**Table S1.** Historically isolation of bioactive compounds from Actinobacteria

| Compound                                | Producer   | Source        | Uses                          | Reference |
|---|--|---------------|-------------------------------|-----------|
| Actinomycin D (1)                       | <i>Streptomyces</i>  | Soil bacteria | Anticancer                    | [1]       |
| Streptomycin (2)                        | <i>Streptomyces</i>  | Soil bacteria | Anti T.B                      | [2]       |
| Gramicidin (3)                          | <i>Streptomyces</i>  | Soil bacteria | Antimicrobial                 | [3]       |
|   | <i>S. venezuelae</i>                                       | Soil bacteria | Antimicrobial                 | [4]       |
|   | <i>S. omiyaensis</i>                                       | Soil bacteria | Antimicrobial                 | [5]       |
| Chloramphenicol (CAP) (4)               | <i>Streptosporangium viridogriseum</i> var <i>kofuense</i> | Soil bacteria | Antimicrobial                 | [6]       |
|   | actinomycetes isolated from soil                           | Soil bacteria | Antimicrobial                 | [7]       |
| Cephamycins C (5)                       | <i>S. lactamdurang</i>                                     | Soil bacteria | Antimicrobial                 | [8]       |
| Fumaramidmycin (6)                      | <i>S. kurssanovii</i>                                      | soil bacteria | Antimicrobial                 | [9]       |
| Crisamicins C (7)                       | <i>Micromonospora purpurea chromogenes</i>                 | soil bacteria | Antimicrobial                 | [10].     |
| Polyene Antibiotics (PA-5 And PA- 7 (8) | <i>Streptoverticillium</i> sp. 43/16                       | soil bacteria | Antimicrobial                 | [11]      |
| Phospholine (10)                        | <i>S. hygroscopicus</i> .                                  | soil bacteria | Anticancer                    | [12]      |
| Simocyclinones D4 (11 A)                | <i>S. antibioticus</i> Tii 6040                            | soil bacteria | Anticancer& Antimicrobial     | [13]      |
| Simocyclinones D8 (11 B)                |  |               |                               |           |
| Fistupyrone (12)                        | <i>streptomyces</i> sp. TP                                 | soil bacteria | Anti. Alteraniria baeassicila | [14]      |
| Streptocidins A-D (13)                  | <i>Streptomyces</i> sp. Tii 6071                           | soil bacteria | Antimicrobial                 | [15]      |
| Cedarmycin A (14-A)                     | <i>S. TP- A0456</i>  | twig of cedar | Antimicrobial                 | [16]      |
| B (14-B)                                |  |               |                               |           |
| Kakadumycin A (15)                      | <i>S. sp. NRRL 30566</i>                                   | soil bacteria | Anti.MRSA                     | [17]      |
| Munumbicins E-4 And E-5 (16)            | <i>S. NRRL3052</i>   | soil bacteria | Anti.MRSA                     | [18]      |

Abbreviations: N.C: Not classified; MDRB, Multidrug resistant bacteria. *S. Streptomyces*, (PK) polyketide

**Table S2.** List of antifungal, growth promoting, antitumor and antiparasitic bioactive compounds, chemical classification and their application which isolated from Actinobacteria.

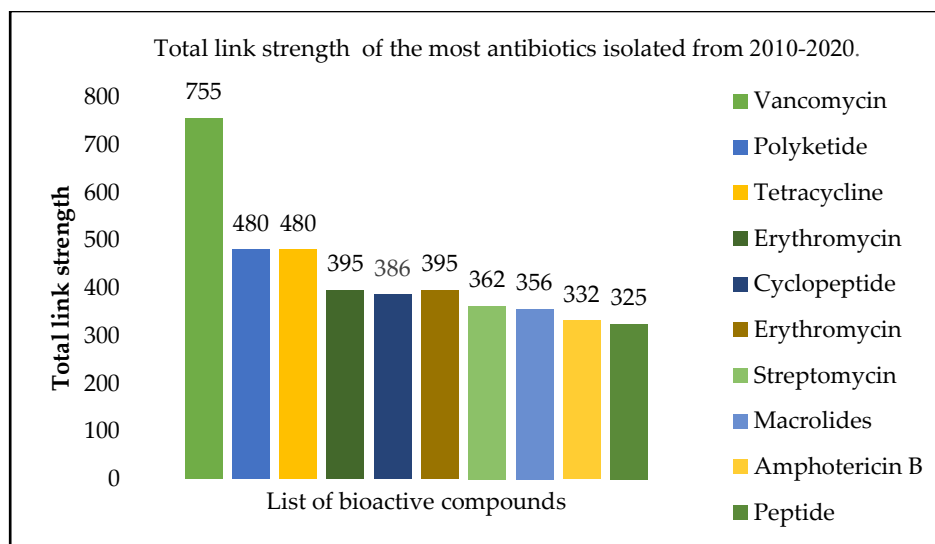
| Antifungal     | Producer                                    | Chemical class     | References |
|----------------|---|--------------------|------------|
| Candididin     | <i>S. griseus</i>                           | polyene macrolide  | [19]       |
| Natamycin      | <i>S. nataensis</i>                         | tetraene polyene   | [20]       |
| Nystatine      | <i>S. noursei</i>                           | polyene macrolide  | [21]       |
| Polyoxins      | <i>S. cacaoi var asoensis</i>               | Nucleoside peptide | [22]       |
| Avermectin     | <i>S. avermitilis</i>                       | Macrolide          | [23]       |
| Hygromycin B   | <i>S. hygrosopicus</i>                      | Aminoglycoside     | [24]       |
| Milbemycin     | <i>S. argilaceus</i>                        | Macrolide          | [25]       |
| Amphotericin B | <i>S. nodosus.</i>                          | PKS*               | [26]       |
| Lasalocid      | <i>S. lasaliensis</i>                       | Polyether          | [27]       |
| Monensin       | <i>S. cinnamonesis</i>                      | Polyether          | [28]       |
| Bambermycin    | <i>S. bambergiensis</i>                     | Aminoglycoside     | [29]       |
| Nosiheptide    | <i>S. actuosus</i>                          | Thiopeptide        | [30]       |
| Sterptothricin | <i>S. lavendulae</i>                        | N-Glycoside        | [31]       |
| Thiostrepton   | <i>S. azureus</i>                           | Thiopeptide        | [32]       |
| Tylosin        | <i>S. fradiae</i>                           | Macrolide (PK)*    | [33]       |
| Virginamycin   | <i>S. virginiae</i>                         | (PK*)              | [34]       |
| Salinomycin    | <i>S. albus</i>                             | Polyether (PK*)    | [35]       |
| Actinomycin D  | <i>Streptomyces lannensis</i><br>T1317-0309 | Peptide            | [36]       |
| Adriamycin     | <i>S. peucetius</i>                         | Anthracycline      | [37]       |
| Bleomycin      | <i>S. verticillus</i>                       | Glycopeptide       | [38]       |
| Mithramycin    | <i>S. argilaceus</i>                        | Aureolic acid      | [39]       |
| Mitomycin C    | <i>S. caespitosus</i>                       | Benzoquinone       | [40]       |
| Actinomycins D | <i>S. sp. ZZ338</i>                         | polypeptide        | [41]       |

Abbreviations: N.C: Not classified; MDRB, Multidrug resistant bacteria. *S. Streptomyces*, (PK) polyketide

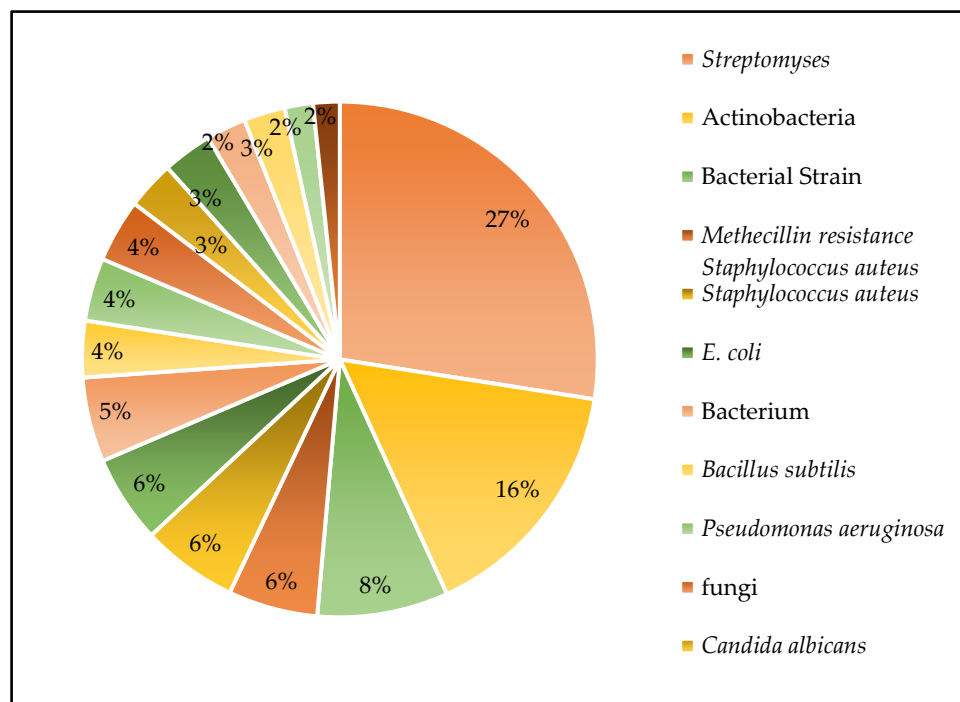
**Table S3.** Terrestrial and rhizosphere Actinobacteria isolation and screening for their antimicrobial activity.

| Bioactive Compound   | Producer  | Chemical Class                     | Bioactivity                        | Source of isolation                 | References |
|--|---|------------------------------------|------------------------------------|-------------------------------------|------------|
| Cyclohexane, Butyl Propyl Ester, And 2,3-Heptanedione.   | S. SUK 08   | N. C                               | Antimalarial Drug                  | Soil                                | [42]       |
| <i>cyclo</i> -(tryptophanyl-propyl) chloramphenicol.   | S. SUK 25   | Diketopiperazine Protein Inhibitor | Anti- MRA                          | Soil. <i>Zingiber spectabile</i>    | [43]       |
| <i>cyclo</i> -(L-Val-L-Pro), <i>cyclo</i> -(L-Leu-L-Pro), <i>cyclo</i> -(L-Phe-L-Pro), <i>cyclo</i> -(L-Val-L-Phe), and N-(7-hydroxy-6-methyl-octyl)-acetamide | S. SUK 25   | Diketopiperazine                   | Anti- MRA                          | Soil. <i>Zingiber spectabile</i>    | [44]       |
| Several compounds  | S. SCA3-4   | N. C                               | MDRB &Pathogenic filamentous fungi | rhizosphere soil, China             | [45]       |
| Unknown  | <i>S. violaceoruber</i> B263 UFL,<br><i>S. albus</i> B262 UFL<br><i>S. badius</i> B192 UFL<br><i>Streptosporangium</i> sp. (AI-21). | N. C                               | MDRB &Pathogenic filamentous fungi | Sahara areas, south of Algeria      | [46]       |
| Actinomycin D  |   | N. C                               | Anti-tumor and antibiotic          | Soil, Uttarakhand, India            | [47]       |
| Unknown  | eighty-six actinomycete   | N. C                               | MDRB                               | Soil, Aquilla Safari, South Africa. | [48]       |
| Unknown  | S. DV1S and GR9a-5  | N. C                               | MDRB                               | Soil, Uttarakhand hills             | [49]       |
| <i>Cyclo</i> (S-Pro-S-Val)   | AGM12-1   | Diketopiperazine                   | Anti-tumor properties              | Soil, Egypt                         | [50]       |
| Unknown  | CA-02, CA-06, CA-07, and CA-17  | phenolic and flavonoid             | antioxidant activity               | Rhizosphere. Brazilian Caatinga     | [51]       |
| Unknown  | <i>Kocuria kristinae</i> ,<br><i>Kocuria rosea</i> ,<br><i>S. griseus</i> ,<br><i>S. flaveolus</i><br>Actinobacteria                | N. C                               | MDRB &Pathogenic filamentous fungi | soil samples of Egypt               | [52]       |

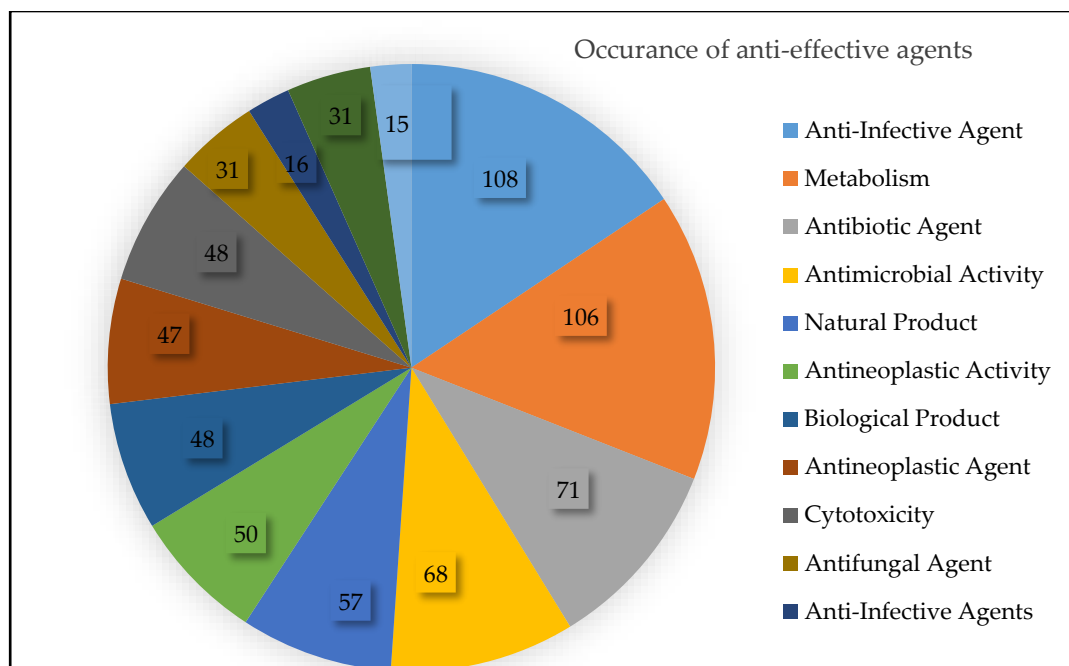
Abbreviations: N.C: Not classified; MDRB, Multidrug resistant bacteria. S. *Streptomyces*, (PK) polyketide



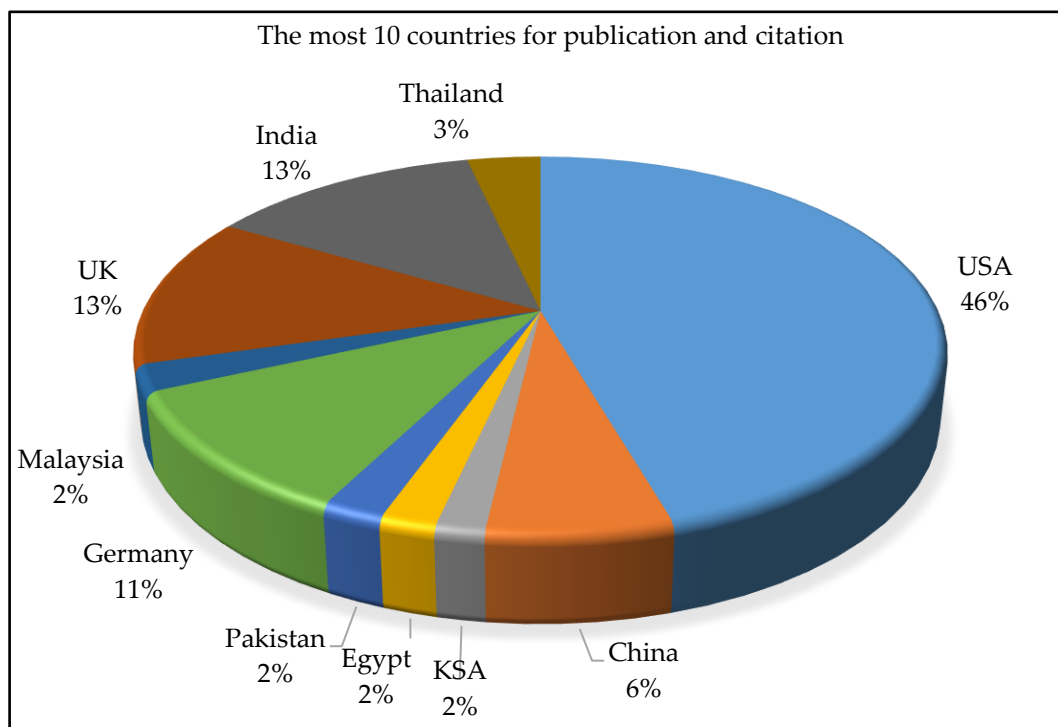
**Figure S1.** The spread of reviewed and cited papers based on the scattered keywords of the antimicrobial isolated from 2010-2020 from phylum Actinobacteria.



**Figure S2.** Percentage of diversity of keywords from the Scopus database for Actinobacteria, *Streptomyces*, natural products, primary, secondary metabolites, habitat effects of environments, pharmaceutical industry using VOSviewer software tool to analyse and visualise scientific literature.



**Figure S3.** Spread of reviewed and cited papers based on the dispersed keywords of anti-infective agents' occurrence. Data was extracted using VOSviewer software to analyse and visualise scientific literature.



**Figure S4.** Spread of reviewed and cited papers based on the scattered keywords of the countries for the publication and citation. Data was extracted using VOSviewer software.

Abbreviations: N.C: Not classified; MDRB, Multidrug resistant bacteria. *S. Streptomyces*, (PK) polyketide