CHAPTER II

A BRIEF REVIEW ON Pesticidal Fluorinated Azoles incorporating \( \text{N-C-S-moiety} \)
The first inorganic compound sodium fluoride containing fluorine was used as an insecticide. Another fluorinated pesticides are sodium fluorosilicate, barium fluorosilicate and fluoroaluminate of sodium, potassium etc. Although some of these compounds have been dominating in the field of pest control for quite a long time, yet they are now unpopular owing inherent toxicity associated many of them because of their residual toxicities. In addition to the phototoxic properties of several of the inorganic pesticides. It was often hazardous to consume the treated fruits and vegetables.

The toxic chemicals used to destroy any species of pest are called pesticides. The growing consciousness for hazards involved in the use of inorganic compounds as pesticides. The search for more efficient and less hazardous pesticidal compounds has evoked considerable attention. Synthetic organic compounds have attracted much attention in this direction because they have been found to be safer are often more specific in action and offer a wide range of the choice.

The heterocyclic compounds biologically occupy nearly the first place among the other classes of organic compounds. The heterocyclic compounds, particularly those incorporating nitrogen in the ring with >N–C–S–moiety evoked some attention, and the growing patents literature of recent years demonstrates that
useful pesticidal activities may be expected in the $\text{N}^{\text{C}}\text{S}^{-}$ moiety if the molecules are suitably designed. Depending on the purpose for which they are used, pesticides may be classified into the following main classes.

(i) **FLUORINATED AZOLES INCORPORATING $\text{N}-\text{C}-\text{S}-$ MOIETY AS ANTIFUNGAL COMPOUNDS**:

The fungitoxicity has been defined as the ability of a chemical to interfere in an adverse way with the vital functions of a fungus by physiochemical means. The use of such chemicals which protect plants from fungal diseases and to prevent deterioration and destruction of cellulosic materials plastics, leather and other articles of economic value by fungi has attained great importance now a days. A large number of antifungal triazinyl heterocyclic compounds incorporating triazine, imidazole, thiadiazole, oxadiazole, pyrimidine and triazole nucleus have been reported as potential fungicides. For example-

Dietz, Jochen; Grote, Thomas; Mueller, Bernd et al. have synthesized some azolylmethyloxiranes of the type (1) and (2) [A=fluoro-substituted phenyl; 
B=pyridyl, thienyl, oxazolyl, etc.] as antifungal agents.$^1$
Dietz, Jochen; Grote, Thomas; et al. have (3) [A=fluoro-substituted phenyl, B=pyridyl, thienyl, oxazolyl etc.] and type (4) was prepared from (2,4,5-trifluoroacetophenone in 5 steps) as antifungal agents\(^2\).

\[
\begin{align*}
(3) & \quad \begin{array}{c}
\text{N} \\
\text{N} \\
\text{CH}_2 - \text{C} - \text{CH}
\end{array} \\
\text{A} & \quad \text{B}
\end{align*}
\]

Dietz, Jochen; Grammenos, Wassilios; et al. have prepared some azolopyrimidines of the type (5), (6) and (7) [G,E,Q=n, C–W\(^1\), C–W\(^2\) with provisos; W\(^1\), W\(^2\)=H, halo, CN, alkyl etc.; W=Ph, 5 or 6-membered heteroaryl ring with provisos; X=halo, CN, Alkyl etc.] as antifungal agents\(^3\).
Some substituted aniline derivatives of the type (8) [wherein \( n = 0 - n \);
\( R^1 \) and \( R^2 \) are independently \( H \), \( (C_1-C_6) \) alkyl, \( (C_1-C_6) \) alkenyl etc. and \( Ar \) is Ph, naphthyl] and compound (9) was prepared by reacting (10) with 3-
trifluoromethoxy phenyl boronic acid by Carr, Andrew David; Neuss et al. as
antifungals\(^4\).
$$R_1^N O \overset{N}{\overset{\text{[CH}_2\text{]}_n CO R_3\text{}}{\text{Ar}}}$$  (8)

$$\text{CH} \equiv \text{CH} \overset{\text{CO}}{\text{N}} \overset{\text{CO}}{\text{N}} \overset{\text{CO}}{\text{N}} \overset{\text{CO}}{\text{N}} \overset{\text{H}_2\text{N}}{\text{N}} \overset{\text{Br}}{\text{CF}_3\text{O}}$$  (9)

$$\text{CO} \overset{\text{N}}{\overset{\text{CO}}{\text{N}}} \overset{\text{CO}}{\text{CH} \equiv \text{CH}} \overset{\text{phenyl}}{\text{phenyl}}$$  (10)
Recently some novel triazole derivatives of the type (11) (R=C\textsubscript{1}–C\textsubscript{14} n-alkyl), type (12) [R\textsubscript{1}=3-F, 3-Cl, 3-Me, 4-NO\textsubscript{2}, 2-NO\textsubscript{2}, etc.] and type (13) [R\textsubscript{2}=H, 4-Me, 2-Me, 4-F] were prepared by Zhao, Quing Jie; Song, Yan; Hu Hong Gang; et al. as antifungals\textsuperscript{5}.

![Chemical Structures](attachment:image.jpg)
Ning, Jun; Chen, Zuohong; Zhang, Tao; et al. have synthesized fluorine containing pyrimidine derivatives of the type (14) and (15) [Wherein X=O, NH, ox, S; R¹=F₂C=CHCH₂, F₂C=CHCH₂CH₂, HC≡CCH₂O, HC≡CCH₂CH₂O, Cl₂C=CHCH₂0 or H₂C=CHCH₂O; R²=H, Me, Cl, F or OMe; A=H, Me, Cl, F, OMe or CF₃] as antifungal agents⁶.

(14)  
(15)

Recently some novel dichlorofluorophenyl containing aminotriazolothiadiazine of the type (16) were synthesized by Karthikeyan, Mari Sithambaram; Holla, Bantwal Shivarama; et al. as antifungal agents⁷.
Dunkel, Ralf; Beeck, Stefan; et al. have recorded 3-difluoro methyl pyrazolyl carboxanilides of the type (17) \([R^1=\text{halo, CN, NO}_2\text{ etc}]\) as antifungal agents\(^8\).

![Chemical Structure](image1)

5-Phenylpyrimidines of the type (18) \([R^1=\text{alkyl, alkenyl, alkynyl, etc.}, R^2=\text{Ph, 5 to 6-membered heteroatom with provisos; } R^3=\text{halo, OH, alkyl etc; } R^4=\text{halo, CN, OH etc.}]\) have been synthesized by Dietz, Jochen; Muller, Bernd; et al. as agricultural antifungal agents\(^9\).

![Chemical Structure](image2)
Yu, Shi-Chong; Cao, Yong-bing; et al. have synthesized 3-trifluoromethyl-4-amino-5-mercapto-1,2,4-triazole derivatives of the type (19) [R=H, halo, alkyl, nitro] as antifungal compounds\(^\text{10}\).

![Chemical structure of (19)](image)

Some pyridazine derivatives of the type (20) and (21) [Wherein R\(^1\)=H, C\(_{1-6}\) (halo) alkyl and C\(_{3-6}\) cycloalkyl; R\(^2\)=cyclo alkyl, (halo)-cycloalkoxy, (halo)-cycloalkyl-alkoxy etc.; R\(^3\)=(un) substituted aryl; R\(^4\)=H, halo, C\(_{1-4}\) (halo) alkyl, C\(_{1-6}\) alkyl]
(halo) alkoxy, OH and CN; n=1 to 4] were synthesized by Syngenta, Switz et al. as antifungal compounds\textsuperscript{11}.

\begin{center}
\includegraphics[width=0.8\textwidth]{structures.png}
\end{center}

Trah, Stephan; Lamberth, Clumens; et al. have synthesized pyridazine derivatives of the type (22) and (23) \([R^1=H, \text{C}_{1-6}\text{(halo)}\text{-}\text{alkyl and C}_{3-6}\text{cycloalkyl}; R^2=\text{halo, NO}_2, \text{CN, C}_{1-4}\text{(halo)}\text{-}\text{alkyl, C}_{1-4}\text{(halo)}\text{alkoxy and C}_{1-4}\text{(halo) alkylthio; R}^3=(\text{un})\text{-}\text{substituted aryl; R}^4=\text{F, CN, C}_{1-4}\text{(halo)}\text{alkyl, C}_{1-6}\text{(halo) alkoxy, C}_{3-6}\text{cycloalkyl and C}_{1-6}\text{(halo) alkylthio; n=1 to 4}]\) as antifungal agents\textsuperscript{12}. 

\begin{center}
\includegraphics[width=0.8\textwidth]{structures.png}
\end{center}
Recently some N-[4-(pyridin-2-yl) butyl]-benzamide derivatives of the type (24) \([n=1–4; \text{each } R^1=\text{independently selected from halo, cyano, hydroxy, amino, carboxy, (un) substituted carbamoyl, } C_{1-8} \text{ alkyl, } C_{1-8} \text{ alkylamino, } C_{1-8} \text{ alkoxy, } C_{1-8} \text{ alkylthio, } C_{1-8} \text{ cycloalkyl, } C_{1-8} \text{ alkylcarbonyl, } C_{1-8} \text{ alkyl sulfonyl, phenoxy, phenylthio, etc. each } R^2=\text{independently selected from H, Halo, cyano, amino, carboxy (un) substituted carbamoyl, } C_{1-6} \text{ alkyl, } C_{1-6} \text{ alkylamino, } C_{1-6} \text{ alkoxy, } C_{1-6} \text{ alkylthio, } C_{3-7} \text{ cycloalkyl, } R^4=\text{halo, nitro, cyano, carboxy, } C_{1-8} \text{ alkyl, } C_{1-8} \text{ alkoxy, } C_{1-8} \text{ alkylthio, } C_{1-8} \text{ alkoxy carbonyl, } C_{1-8} \text{ alkylsulfonfyl etc., } P=0-4 \text{ and each } R^5=\text{independently, H, halo, cyano, carboxy, } C_{1-8} \text{ alkyl, } C_{1-8} \text{ alkoxy, } C_{1-8} \text{ alkylthio, } C_{1-8} \text{ alkoxy carbonyl, } C_{1-8} \text{ alkylsulfonfyl etc.; including salts, N-oxides, metallic complexes, metalloidic complexes and optically active isomers} \text{ have been synthesized by Coqueron, Pierre-Yues et al. as phytopathogenic antifungal agents}^{13}."}
Dietz, Jochen et al. have recorded azolylmethyloxiranes of the type (25) [A,B=substituted benzodioxolyl, i.e. halo, cyano, nitro etc.; azolyl methyloxiranes and (26) was provided as antifungal agents\textsuperscript{14}.

S.K. Narwade, S.B. Kale and B.K. Karale have synthesized [\textit{2-(\textit{\textit{\textit{3-(2,4-dichloro-5-fluorophenyl)-1-phenyl-1H-pyrazole-4-yl)-1H-pyrazole-3-yl}}) phenols}] (27) and 2-(3-(2,4-dichloro)-5-fluorophenyl)-1-phenyl-1H-pyrazol-4-yl)-3-bromo-4H-chromon-4-ones (28) (R=H, CH\textsubscript{3}, Cl), R\textsubscript{2}=H, CH\textsubscript{3}, R\textsubscript{3}=H, Cl, Br, F, CH\textsubscript{3}, C\textsubscript{2}H\textsubscript{5}) as antifungal compounds\textsuperscript{15}. 
Sareen, Vineeta et al. have synthesized 2-(phenyl substituted thioureido)-4-(2-chloro-4-trifluoro methyl phenyl amino) -6(-4 pyridyl) amino-1,3,5-triazine (29) as antifungal agents\textsuperscript{16}. 

\begin{align*}
\text{(27)}
\end{align*}
Sokolov, V.B. et al. synthesized antifungal compound fluoro containing pyrimidinones of the type (30) & (31) \([R=\text{Me, Ph}]\) as antifungal compounds\(^{17}\).

\[
\text{(30)}
\]

\[
\text{(31)}
\]

Methyl benzo [1,3,5]- triazines of the type (32) \((X=\text{CF}_3, \text{COOMe})\) have been synthesized by Sokolov, V.B. et al. as antifungal agents\(^{18}\).
Solankee, Anjani; et al. have synthesized some new fluorine-containing triazine-based chalcones and their derivatives of the type (33) as antifungal agents \(^\text{19}\) [R=Me with aldehyde].

![Chemical Structure](image1)

(33)

Tormo i Blasco, Jordi; et al. have prepared 6-(2,6-di-fluorophenyl triazo \[1,5-a\] pyrimidine (34) and (35) (R\(^{1-2}\)=H, alk (en/yn) yl, alkadienyl; etc. X=halo, CN, Alkyl etc.) as fungicides \(^\text{20}\).

![Chemical Structure](image2)

(34)

(35)
Krishnadatt Sharma et al. have synthesized substituted quinolones derived from 6-fluoro-3-carbethoxy-1H-quinolin-4-one of the type (36) as antifungal agents\textsuperscript{21}.

\begin{align*}
\text{(36)}
\end{align*}

Shixianfeng et al. have synthesized 2-amino-4-(dimethyl amino)-6-(2,2,2-trifluoroethoxy)-1,3,5-triazine derivatives of the type (37) as antifungal copounds\textsuperscript{22}.

\begin{align*}
\text{(37)}
\end{align*}
1,3,5-Triazine-2,4,6-triones of the type (38) \((n=2-4, \text{R}^1, \text{R}^2=\text{H})\) (un) substituted alkyl have been recorded by Guo et al. as antifungal agents\(^{23}\).

Some new 1,3,4-oxadiazolo-[3,2-a] [1,3,5]-triazine-5 (6H, 7H)-thiones and their precursors (39) & (40) \((\text{R}=\text{H}, 2-\text{Cl}, 2-\text{Cl}, 2-\text{OMe}, 4-\text{OMe}; \text{R}^1=\text{H}, 2-\text{Me})\) have been synthesized by Mishra, A.R. et al. as antifungal compounds\(^{24}\).
Markns et al. have prepared 6-(2,6-difluorophenyl)-triazolo-(1,5-a) pyridines of the types (41) and (42) as fungicides\textsuperscript{25}. \([R^1, R^2=H, \text{alk (en/yno as Kedienyl etc.; } X=\text{Halo, CN, alkyl, alkoxy etc. } I-\text{PrNH}_2=\text{Et}_3\text{N, CH}_2\text{Cl}_2)\).
N-(Fluoroalkoxy phenyl sulphonyl N\(^1\)-(1,3,5-triazinyl) ureas of the type (44) [n=2-4; A=N, CX; X=H, halo, alkyl, alkoxy or R\(^1\) CX R\(^2\)=CH\(_2\)CH\(_2\)O, CH\(_2\)CH\(_2\)S, CH\(_2\)CH\(_2\)CH\(_2\), R=H, cyano, halo (sub) alkyl, alkoxy, alkylthio (di) alkylamino, R\(^2\)=H, cyano, halo (substituted) alkyl, alkoxy, alkylthio (di) alkylamino, cycloalkyl; R\(^2\)=H, cyano, halo, alkoxy, alkoxy carbonyl, substituted alkyl; R\(^4\)=halo (substituted) alkyl, alkoxy, alkenyl, alkenyloxy, alkynylesoxy, cycloalkyl and salt were prepared as fungicides\(^{27}\).

Some new 2-[4-fluoro phenyl] 1,2,4-triazolo [5,1-b] benzo thiazoles of the type (45) (R=H, CH\(_3\), C\(_2\)H\(_5\), R\(^1\)=H, CH\(_3\), C\(_2\)H\(_5\)) have been prepared by Kiran Mishra et al. as antifungal compounds\(^{28}\).
Some new s-triazolo [3,4-b] [1,3] thiazine-4-ones of the type (46) have been synthesized by A.K. Pandey et al. as fungicides \(^{29}\) \([R=C_6H_5, 4-CH_3C_6H_4, 4-FC_6H_4, 2-CH_3OC_6H_4, R^1= 2-ClC_6H_4, 4-ClC_6H_4, 2-CH_3OC_6H_4]\).
Synthesis and antifungal activity of some new 4-(substituted phenyl)-1,3,4,5-tetrahydro pyrazolo [3,4-d] pyrimidine-6-ones/6 thiones of the type (47) were studied by Urmila Gupta et al. as fungicides\textsuperscript{30} [R=4-\text{OCH}_3, \text{H}, 4-\text{F}, 2-\text{Cl}, 2-\text{OH}, 2-\text{OCH}_3].
(ii) FLUORINATED AZOLES INCORPORATING $>\text{N}--\text{C}--\text{S}<$ MOIETY AS INSECTICIDES:

Yamamoto, Kazumi, Horikoshi, Akira et al. have prepared some quinolines of the type (48) $[R^1=\text{C}_{1-4} \text{ alkyl, C}_{3-4} \text{ cycloalkyl, C}_{2-4} \text{ alkenyl, OR}^5, \text{SR}^5, R^2R^5=\text{C}_{1-4} \text{ alkyl}]$ as insecticidal agents$^{31}$.

Jeschke, Peter et al. have recorded some of $\text{N}^1$-cyano-$\text{N}$-ethanimidamides of the type (49), (50) and (51) $[A=\text{aryl, heteroaryl, hetero-cycle, etc.}; R^1=\text{alkyl, alkenyl, cycloalkyl, etc.}; R^2=\text{halo substituted aryl or cycloalkyl}; B=\text{methylene, alkylene etc.}]$ as insecticides$^{32}$.
Morita, Masayuki; Yoneda, Tetsuo et al. have prepared some anthranilamides of the type (52) \([R^1=\text{Cl, Br, Me}; R^2=\text{Cl, Br, iodine, cyano}; R^3=\text{Cl, Br, CF}_3\text{CH}_2\text{O}]\) as insecticidal agents\(^{33}\).

Recently some N-isoxazolylphenyl benzamide derivatives of the type (53) \([A^1-A^4=\text{independently C-X or N, provided that no more than two of A}^1-\text{A}^4 \text{ are nitrogen}; X=\text{independently H, halo, alkyl etc}; R^1,R^2=\text{independently H or alkyl (carbonyl)}; G^1, G^2=\text{independently O or S}; Q_1=(\text{un}) \text{substituted (hetero) aryl}; R^3=\text{H, (halo) alkyl, Ph etc. R}_3=\text{H, halo, cyano etc. and salts or N-oxides}]\) have been reported by Renold, Peter; Maienfisch, Peter; Jung et al. as insecticides\(^{34}\).
Loso, Michael R; Nugent, Benjamin M, et al. have synthesized some thiazolylalkylsulfoximines of the type (54) \( X=\text{NO}_2, \text{cyano}, \text{CO}_2R^4, \text{COR}^5; \)

\( L=\text{bond, CH-(CH}_2)_m; m=1-3; R^1\text{SL}= \text{atoms to from 4-6 membered ring}; n=0-3; y=\text{alkyl, haloalkyl, alkenyl, haloalkeny}, \text{F, Br, iodo, alkoxy, haloalkoxy, cyano, NO}_2 \)

\( R^1=\text{alkyl, haloalkyl, alkenyl, haloalkeny}, \text{F, Br, iodo} \); \( R^2R^3=\text{H, Me, Et, cyclopropyl, F, Cl, Br, iodo, R}^4=\text{alkyl, haloalkyl, aryl, heteroaryl, aralkyl, heteroaralkyl, R}^5=\text{H, R}^4; Q=(\text{CR}^2R^3)_n \) as insecticidal agents\(^{35}\).
Some N-substituted (heteroaryl) cycloalkyl sulfoximines of the type (55) \[A=(\text{CH}_2)_n, \text{n}=0 \text{ to } 3; B=(\text{CH}_2)_m, \text{m}=0-1; X=\text{NO}_2, \text{CN}, \text{(un) substituted CO}_2\text{H}, \text{C(O)H}, \text{y}=0 \text{ (un) substituted heteroaryl}\] have been prepared by Loso, Michael R; Nugent, Benjamine; M.; Huang, Jim X, et al. as insecticides\(^\text{36}\).

\[
\begin{array}{c}
\text{B} \quad \text{Y} \\
\quad \text{A} \\
\text{R}^1 \quad \text{S} \\
\quad \text{R}^2 \\
\text{O} \quad \equiv \\
\quad \text{N} \quad \equiv \quad \text{X}
\end{array}
\]

(55)

Loso, Michael R.; Nugent, Benjamin M., et al. have reported some alkylsulfonylidene cyanamides of the type (56) and (57) \[\text{Het}=(\text{un}) \text{ substituted thiazolyl, oxazolyl, imidazolyl etc.; n=} 0-3; L=\text{a single bond, CH}_2 \text{ or CH(CH}_2)_p; \text{P}=1-3; \text{R}^1=(\text{halo}), \text{alkyl}, (\text{halo}) \text{ alkenyl, alkynyl, etc.; R}^2\text{R}^3=\text{independently H, halo, alkyl, etc. Q=NO}_2, \text{or CN}] as insecticidal agents\(^\text{37}\).
3-Substituted 2-amino-5-halobenzamides of the type (58) \([\mathbf{R}^4=\text{Cl, Br, CF}_3, \text{OCF}_2\text{H}, \text{or OCH}_2\text{CF}_3; \mathbf{Z} = \text{C}R^7 \text{or N; R}^5 = \text{F, Cl, or Br; R}^6 = \text{H, F or Cl; R}^7 = \text{H, F, Cl or Br}]\) have been recorded by Davis, Richard Frank; et al. as insecticides\(^{38}\).

Shibata, Takashi et al. have recorded phenyltriazole derivatives of the type (59) \([\mathbf{T}^1 = \text{S(O)}_n\text{R}; \mathbf{Q} = \mathbf{Q}_1, \mathbf{Q}_2; \mathbf{R} = (\text{un}) \text{substituted alkyl cycloalkyl etc}; \mathbf{B} = \text{H, halo, methyl; B2=halo, cyano, nitro etc.}]\) as insecticidal agents\(^{39}\).
Takahashi et al. have prepared triazolyl cinnamano-nitrile compound of the type (60) as insecticides\textsuperscript{40}.

\begin{equation}
\text{(60)}
\end{equation}

Some new 3-aryl-5-heterocycl-1,2,4-triazoles (61) and (62) [Ar=(substituted) Ph, R\textsubscript{1}=alkyl, haloalkyl alkenyl, alkynyl, alkoxy, alkyl, F, I, E, T= (substituted) isothiazolyl, isoxazolyl, oxazolyl, thiazolyl, pyrazolyl, pyrrolyl, thiazolyl] have been reported as insecticides\textsuperscript{41}.
Yogihara et al. have synthesized thiazolylathones of the type (63) as insecticides\(^{42}\).

(63)

Recently various novel heterocyclic nitro alkenes of the type (64) \([A=(\text{un})\text{substituted heterocyclic rings with 5 to 6 atoms containing } N, O, S \text{ etc (substituted=halo alkyl, halo alkyl thio, (un) substituted (hetero) aryl etc. } E=0.50-2 (\text{un})\text{substituted amino (substituted=alkyl, haloalkyl; } M=N, CH, CCHO; Q=NO_2, CN \text{ COCF}_3; G, T=N \text{ alkyl, alkenyl, alkynyl, haloalkyl, haloxyalkyl } G \text{ and } T \text{ may be connected by single bond or bridge consisting of } CH_2CH(CH_2), CH (\text{alkyl=halo}), CHF, CF_2, O, SO=0-2 (\text{alkyl or haloalkyl) amino etc.} ] \) have been reported by Sparks et al. as insecticides\(^{43}\).
Klemmensen et al. have synthesized trifluoro methyl thio ether and its substituted derivatives of the type (65) and (66) which are used as insecticidal agents. 

(65)

(66)
(iii) FLUORINATED AZOLES INCORPORATING >N–C–S<–MOIETY AS BACTERICIDES:

Liu, Dingaming; Wu, Bin, et al. have prepared some prulifoxacin and intermediates of the type (67) as bactericides\(^{45}\).

![Image](image-url)

(67)

Recently some 7-(4-oximino-3-amino-1-piperidyl) quinolin-4-one-2-carboxylic acid derivatives of the type (68) \([n=0 \text{ or } 1; \ A=\text{CH}, \text{CF}, \text{CCl}, \text{COCH}\text{\(^3\)}, \text{COCHF}\text{\(^2\)}, \text{CCH}\text{\(^3\)} \text{or N}; \ R^1=\text{alkyl}, \text{FCH}\text{\(^3\)}\text{CH}\text{\(^2\)}, \text{cyclopropyl}, \text{substituted Ph etc.}; \ y=\text{H}, \text{OH}, \text{alkyl, etc.}; \ R^2=\text{alkyl}, \text{R}\text{\(^3\)} \text{and } R^4=\text{independently H, alkyl, and R}\text{\(^5\)}=\text{H, NH}\text{\(^2\)}, \text{or CH}\text{\(^3\)}] \) have been synthesized by Guo, Hui yuan; Wang, Xiuyun; et al. as bactericides\(^{46}\).
Haydon, David Ryall; et al. have prepared some benzothiazole derivatives of the type (69) [Q=H or cyclopropyl; X=CONR^6, S(O)NR^6. CO_2 or SO_2; R^6=H, (un) substituted alkyl, alkenyl, alkynyl, etc.; Z=N, CH or CF; R^2=-Q^2(L^1)_q Q^1; R^3=-Q^3(L^2)_p Q^4; m, p and q= independently 0 or 1 : alk and L^1= independently (un) substituted alkene, alkenylene or alkynylene, which may contain an ether, thioether or amino link; Q^2 and Q^3= independently (un) substituted monocyclic or bicyclic (Hetero) ring; Q^1 and Q^4=independently H or (un) substituted (hetero) ring] as bactericides^47.
Recently some 4-(1-naphthyl)-6 arylpyrimidine-2-(1H)= ones of the type (70) [R=H, NO$_2$, Cl or F] have been prepared by Vijayramalingam, K.; Chandrasekaran, S.; Nagarajan, S. as bactericides$^{48}$.

Brooks, Gerald; Miles, Timothy James et al. have syntehsized azatricyclic compounds of the type (71) [one of B and D is CH$_2$, the ether of a bond, one of Z$^1$ and Z$^2$ is CH or N, the other is CH; R$_{1a}$, R$_{1b}$=H, halo cyano etc.; R$_2$=H or alkyl; further detail on R$^2$ is given; A=Q$^1$, etc. R$_3$ is as defined for R$_{1a}$ and R$_{1b}$ or is given; n=1, 2; U=CO or CH$_2$; R$_5$= (un) substituted bicyclic carbocyclic or heterocyclic Q$^2$ containing upto 4 heteroatoms in each ring in which at least one of rings a and b is aromatic; X$^1$ is C or N; X$^2$ is N, NR$_{13}$O, etc., X$_3$, X$_5$=N or C; Y$_1$=o to 4 atom linker group, each atom of which is selected from N, NR$_{13}$, O etc. (when part of an aromatic or a non-aromatic ring), Y$_2$=2 to 6 atom linker group, each atom of which is selected from N, NR$_{13}$, O etc. or may additional be CR$_{14}$R$_{15}$;
$R^{13}=H$, trifluoromethyl, alkyl, $R^{14}$ and $R^{15}=H$, alkylthio halo etc.] as antibacterial agents\textsuperscript{49}.

Some azolylureas of the type (72) [$R^l=$(substituted) aryl, aralkyl, heteroaryl; $X, X^1=C, N,Y=CH, C, O, S, N; R^2R^{21}=H$ (substituted) alkyl perfluoroalkyl; $R^3,R^{31}=$null, H, halo, $R^5R^6Y^-$ CR$^4R^{41}$; $R^4,R^{41}=H$ (substituted) alkyl, perfluoroalkyl; $R^4,R^{41}-O$, $R^5$, $R^6=$null, H, O, OH (substituted)] have been synthesized by Guiles, Joseph; Jarvis, Thale as bactericides\textsuperscript{50}.
Shi, Xiulan have prepared thiadiazole contained oxazolidone of the compound (73) \[R=H, F; m=1-4\] as anti-bacterials\textsuperscript{51}.

![Chemical structure of (73)]

1,3-Dialkylbenzimidazolium halides of the type (74) \[R^1,R^2=\text{alkyl}; X=\text{F, Cl, Br, Iodide}\] have been reported by Stradomskii, B.V. et al. as antibacterial agents\textsuperscript{52}.

![Chemical structure of (74)]

Asahina, Yoshikazu; et al. have prepared some novel pyrido-[1,2,3-de] [1,4] benzoxazine-6-carboxylic acid derivatives carrying the 3-
cyclopropylamino-methyl-4-substituted-1-pyrro-lidinyl group as a C-10 substituent of the type (75) [R^1=Me, CH_2F; R^2, R^3=H, Me, F] as bactericides\(^5^3\).

(75)

Recently some 5-hydroxymethyl-oxazolidin-2-one derivatives of the type (76) [R^1=OH, OPO_3H_2 or OCOR\(^5\); R^2=H, OH or OPO_3H_2; R^3=H or halo; R^4=H, alkyl or cycloalkyl; R^5=piperdin-4-yl, n=0 or 1] have been synthesized by Hubscherlen, Christian; Panchaud, Philippe; et al. as bactericides\(^5^4\).

(76)
Srivastava, Brijesh K.; Jain, Mukul R.; et al. have reported quinoline derivatives of the type (77) \([R^1=H, (C_{1-12}) \text{alkyl}, (C_{3-12}) \text{cycloalkyl}; R^2, R^3=H, OH, halo, alkoxy, NO_2, cyano; R^8, R^9, R^{10}, R^{11}=H, alkyl; R^4, R^5, R^6, R^7=H, halo, haloalkyl, OH, alkoxy, thio, NO_2, cyano, amino (C_{1-12}) \text{alkyl}, (C_{1-12}) \text{alkoxy derivatives of sulphenyl or sulphonyl group, sulphonic acid and derivatives, } Z=O, S, NR, R=H, OH, (C_{1-3}) \text{alkyl}; X=\text{absent or CH}_2, O, S, SO, SO_2; Y=(CH_2)_n, n=0-3]\) as anti-bacterial agents\(^55\).

Some oxazolidinones linked to quinolones or napthyridinones of the type (78) \([R^1=OH, OPO_3H_2, O_2CR^5; R^2=H, OH, OPO_3H_2; A=N, CR^6; R^3=H, F; R^4=H, alkyl, cycloalkyl, R^5=\text{residue of a naturally occurring amino acid. } R^6=H, alkoxy, halo; n=0,1]\) were prepared by Hubscherlen, Christian et al. as bactericides\(^56\).
Yagneskumar, Trivedi Amit et al. have synthesized piperazinylquinolones of the type (79) as useful anti-bacterial compounds\textsuperscript{57}.

![Diagram of molecule (79)]

Recently some novel 4-[5-(substituted phenyl)-1-phenyl-4,5-dihydro-1H-3-pyrazolyl]-2-methylphenol derivatives of the type (80) were prepared by Ali Mohammad Ashraf et al. as anti-mycobacterials\textsuperscript{58}.

![Diagram of molecule (80)]
N-Benzyl-3-sulfonamidopyrrolidines of the type (81) have been recorded by Mukherjee et al. as bactericides\(^5\).  

\[
\text{(80)}
\]

\[
\text{(81)}
\]

1,2,3-Triazoloimidazole derivatives of the type (82) \([Y=\text{O or NR}^1;\]
\(R^1=\text{H, halo, NO}_2, \text{CN, NH}_2, \text{C}_{1-8}\ \text{alkyl, C}_{1-8}\ \text{alkyl amino, C}_{1-8}\ \text{aryl etc.}\ \text{n}=1, 2\ \text{or}\ 3;\]
\(R^1=\text{aryl, heteroaryl or alkyl}\) were prepared by Yu, Chuyi; Yuan et al. as anti-bacterial agents\(^6\).  

\[
\text{(82)}
\]
B. Holla et al. have synthesized some fluorine containing (aryl furyl)-
N-phenyl pyrazolines of the type (83) \([R=2, -3, -4, -\text{NO}_2; 2-, 4-\text{Cl}, 4-\text{Br}]\) as
bactericides\(^6\).

![Chemical Structure](image)

(83)

Lebreton, Sylvain, Newcombe et al. have been synthesized triazine
based anti-bacterial agents\(^6\) of the type (84) \([R^1=4-\text{MeC}_6\text{H}_4, 4-\text{MeOC}_6\text{H}_4, 1,3-
benzodioxolan-5-yl; R^2=\text{Ph, 3-FC}_6\text{H}_4, 4-\text{F}_3\text{CC}_6\text{H}_4, R^3R^4\text{N=piperdino, morpholino, 4-methyl piperazino]}\).

![Chemical Structure](image)

(84)

Foroumadi et al. have prepared N-[5(5-nitro-2-thienyl)-1,3,4-
thiadiazol-2-yl] piperaziynyl quinolones of the type (85) \(\text{wherein } X=\text{CH, R=Et, C-propyl; X=N; R=Et}\) as anti-bacterial agents\(^6\).
Recently various quinolines of the type (86) \((R^1=\text{Et, ethylpiperidinyl,} \ 4-\text{O}_2\text{NC}_6\text{H}_4; R^2=\text{CO}_2\text{H, CONH}_2; R^3=\text{Cl, F; R}^4=\text{Cl, 4-C}_2, 4-\text{dinitrophenylpipperazine,} \ 4-(2,4, \text{diaminophenyl) pipperazine, 4-}(3,4,5-\text{trimethoxy benzoylpipperazine have} \) been synthesized by Gherghe et al. as antibacterials\(^6^4\).

![Chemical Structure](image)

Solankee, Anjani et al. have synthesized new chalcones of the type (87), (88) and (89) \([R^1=4-\text{FC}_6\text{H}_4, 2-\text{NO}_2\text{C}_6\text{H}_4, 2-\text{furyl, 3-pyridyl etc.}]\) as bactericides\(^6^5\).

![Chemical Structure](image)
Solankee et al. have synthesized some new fluorosubstituted 1,3,5-triazine derivatives of the type (90) as bactericides\textsuperscript{66}. 
6-Phenyl-N-phenyl-[1,3,5]-triazine-2,4-diamine derivatives of the type (91) \( Q=\text{NH, N(CN}_2\text{)_n, etc.; } N=1-10, R^1=\text{H, OH, alkyl, alkoxy, Cl, I, Br, etc.}; \)
\( R^2=\text{H, OH, alkyl, alkoxy, Cl, F, Br, etc.; } R^4, R^5=\text{H, OH, alkenyl, alkynyl, alkoxy} \)
have been synthesized as bactericides\(^\text{67}\).
(iv) FLUORINATED AZOLES INCORPORATING >N-C-S< MOIETY AS ANTIMICROBIAL AGENTS.

Delorme, Daniel; Houghton, Tom; et al. have prepared some new phosphonated oxazolidinones of the type (92) as anti-microbial agents\textsuperscript{68}.

![Image of structure 92]

Some novel dichlorofluorophenyl containing amino-triazolothiadiazines of the type (93) have been reported by Karthikeyan, Mari Sithambaram et al. as antimicrobial agents\textsuperscript{69}.

![Image of structure 93]
Macielag, Mark J; et al. have recorded oxazolidinone prodrugs of the type (94) [R=leaving group that undergoes a reaction in a biol. matrix to produce active drug R=H, Q₁] were prepared as antimicrobial agents₇₀.

N.B. Patel and S.N. Agravat et al. have synthesized 2-[(3'-trifluoromethylphenyl)-amino]-3-[N⁴-(N¹-(7¹-substituted aryl)benzothiazolyl) sulfonilamido] carbonyl pyridines of they type (95) as antimicrobial agents₇¹.
R. Perumal et al. have synthesized 3-substituted N-substituted phenyl pyrazolo (3,4-d] pyrimidin-4-ones of the type (96) as antimicrobial agents\textsuperscript{72}.

![Chemical structure of compound (96)](image)

Dr. Shrinivasa et al. have synthesized 2-[N-p-tolyl sulphon hydrazino] 6-fluoro-7-substituted (1,3)-6D benzothiazoles of the type (97) and (98) as antimicrobial agents\textsuperscript{73}.

![Chemical structures of compounds (97) and (98)](image)
Some new fluorine containing 1,2,4-triazoles of the type (99) have synthesized by B. Shivarma Hollo et al. as antimicrobial compounds\textsuperscript{74}.

\begin{center}
\includegraphics[width=0.5\textwidth]{image1}
\end{center}

\begin{center}
\textbf{(99)}
\end{center}

Zair Alam, Mohd. Imran and S.A. Khan have synthesized some pyrimidine derivatives of the type (100) as anti-microbial agents\textsuperscript{75}. [$R_1$=4F, 2-Cl, 4Cl, $R_4$=3-OCH$_3$, H, 2-0CH$_3$, $R_3$=OCH$_3$, NO$_2$].

\begin{center}
\includegraphics[width=0.5\textwidth]{image2}
\end{center}

\begin{center}
\textbf{(100)}
\end{center}
Vijay N. Pathak et al. have recorded 5-aryl/alkyl-7-alkyl-6-arylozo-2,3-dihydro-1H-1,4-diazepine of the type (101) as antimicrobial compounds\textsuperscript{76} [X=4Cl, 2Cl, 3-Cl, 4-Br, 4-F, 4-OCH\textsubscript{3}].

\begin{equation}
\text{(100)}
\end{equation}

1-Cyclopropyl 6-fluoro 1,4-dihydro-4-oxo-7-chloro-3[N-(phenyl amino) carbonyl quinoline 5a of the type (102) [R=H, OCH\textsubscript{3}, m-CH\textsubscript{3}, p-methyl, p-o-CH\textsubscript{3}, o-OCH\textsubscript{3}, o-Cl, m-Cl, O-NO\textsubscript{2}, p-NO\textsubscript{2}] have been synthesized by N.B. Patel et al. as anti-microbial compounds\textsuperscript{77}.

\begin{equation}
\text{(101)}
\end{equation}

\begin{equation}
\text{(102)}
\end{equation}
Some new sulphonamidofluorobenzothiazoles of the (103) have been synthesized by Jitender Kumar et al. as anti-microbial compounds\textsuperscript{78}.

$$\text{(102)}$$

Some new 5-aryl-1,2,4-triazolo [3,4-b] [1,3,4] thiadia-zipino [3,2-f] quinolones of the type (104) have been synthesized by G.K. Nagaraja et al. as antimicrobial agents\textsuperscript{79}. [$R^1=$H, Br, OCH\textsubscript{3}, Cl, F; $R^2=$H, Cl, OCH\textsubscript{3}]
(v) FLUORINATED AZOLES INCORPORATING >N–C–S–MOIETY AS HERBICIDES:

Recently some N-Heterocyclcyl pyrazole-carboxamides of the type (105) [X and Y are independently O and S; R¹, R², R³, R⁴ and R⁵=independently H, halo, CN, NO₂, OH, (un) substituted C₁–₆ alkyl etc. A= (un) substituted 5-membered heterocyclic ring; P=CR¹², N; Q=CR¹³, N; S=CR¹³, N; T=CR¹⁵, N; R¹²,R¹³,R¹⁵= independently H, halo, C₁–₂ (fluoro) alkyl, C₁–₂ (fluoro) alkoxy, and C₁–₂ (fluoro) alkylthio; Z is a bond and a chain containing 1-5 carbon/or hetero-atoms forming ring B] have been reported by Werthington, Paul Anthony; Bentley, Philip; et al as herbicidal agents⁸⁰.

of the type (106) [R⁴=(R⁴)n; n=0-3; R⁷=A-Q; R¹=H, amino, OH, etc; R²=H, alkyl, alkenyl etc.; R³=H, alkyl, alkenyl, etc.; R⁴=H, halo, CN, etc. R⁵=alkyl, cycloalkyl, haloalkyl etc. R⁶=H, alkyl, alkenyl, etc.; A=CH₂, CH₂CH₂, C(CH₃)₃ etc; Q=5 or 6
membered ring. For example methyamine medicated opening of lactone (107) afforded amide (108) are reported as herbicides$^{81}$. 

(106)
Ning, Jun; Chen, Zuohong; et al. have recorded some triazine derivatives of the type (109) as herbicidal agents\(^8\).
1-Phenyl-5-(piperazin-1-yl)-pyrazoles of the type (110) and (111)

[R¹=cyano, Me, CF₃, C(:NZ)-S(O)p-C₁₋₆ alkyl, C₁₋₆ CSNH₂; Z=H, C₁₋₆ alkyl, C₁₋₆ haloalkyl, C₃₋₆ alkenyl, C₃₋₆ alkynyl, (CH₂)qR³, CoR⁹, CO₂-C₁₋₆ alkyl, S(O)PR⁹; R²=H, Me, halo, (un) substituted NH₂; R³= C₁₋₃ haloalkyl, C₁₋₃ haloalkoxy, SF₅, R=H, C₂₋₆ alkenyl, C₂₋₆ haloalkenyl, C₂₋₃ alkynyl, C₂₋₆ haloalkynyl, C₃₋₇ cycloalkyl, -C₁₋₆ alkyl, CO₂-C₁₋₆ alkyl, CO₂-C₃₋₆ alkenyl; CO₂- C₃₋₆ alkynyl, CO₂⁻-(CH₂)q R³, CO₂-(CH₂)q R¹₀, (un) substituted CONH₂, SO₂R⁹ etc. R⁵=C₁₋₆ alkyl, C₁₋₆ haloalkyl, C₂₋₆ alkenyl, C₂₋₆ haloalkyl; A, E=each (un) substituted C₁₋₆ alkylene, A and E may be linked to from a bicyclic system R⁹=C₁₋₆ alkyl, C₁₋₆ haloalkyl, C₃₋₇ cycloalkyl, -C₁₋₆ alkyl-C₃₋₇ cycloalkyl, heterocycl alkyl etc; R¹₀=(un) substituted heterocycl; n, p=0-2] were recorded by Schnatterer, Stefen et al. herbicidal compounds⁸³.
Hino, Tomokazu et al. have prepared haloalkylsulfonyl-aminobenzyle moiety-containing oxazinone and oxazepane derivatives of the type (112)

\[ A^1 = (\text{CR}^7 \text{R}^8)_n; n=1 \text{ or } 2; \ R^1 = \text{haloalkyl}; \ R^2 = \text{H, alkoxy carbonyl, alkyl carbonyl etc.} \]

\[ R^3, R^4 = \text{H, alkyl, cyclo alkyl, etc. or } R^3 \text{ and } R^4 \text{ together form a ring; } R^5, R^6 = \text{H, alkyl, cyclo alkyl etc.} \]

\[ R^7 - R^{10} = \text{H, halo, alkyl, etc.}; A = O, S; W = O, S; X = \text{halo, alkyl, alkenyl, etc.}; m = \text{integer of 0 to 1} \] used as herbicides\textsuperscript{84}.

Sandeep et al. have synthesized a zinyl phenyl ethers of the type (113)

\[ X, Y = \text{CH, halo, cyano, NO}_2, \text{haloalkyl, haloalkoxy, } Z = O, S, Q = (\text{substituted}) \]

pyrazol, imidazolyl, triazolyl tetrazolyl, pyridazinyl etc. Ar = (substituted) aryl heteroaryl as herbicides\textsuperscript{85}.  

![Chemical Structure](image-url)
Bojack G. et al. have synthesized amino triazines of the type (114)

\[
A=(\text{un}) \text{substituted, aryl, heteroaryl, etc.} \quad B=\text{direct bond, alkylene, alkenylene etc.} \\
W=O, S, H_2(\text{SIC}); \quad V=\text{CH}_2, S, O \text{etc.} \quad R^1, R^2=H, \text{amino, alkyl, etc.}; \quad Q=O, S, \text{SO etc.}; \\
D= (\text{un}) \text{substituted aryl heteroaryl] as herbicides}^{86}.
\]

Some substituted diaryl ethers of the type (115) [X, Y=H, halo, CN,
NO_2, haloalkyl; Z=0, S; Q=(un) substituted
N-containing heterocyclyl, Ar=(un substituted aryl or heteroaryl)] were prepared as
herbicides$^{87}$ and 4-chloro-3 (4-chloro-2-fluoro
5-hydroxy phenyl)-1-methyl-5-trifluoromethyl-1H-pyrazole with 2-chloro-4,6-
dimethoxy triazine in the presence of $K_2CO_3$ in DMF afforded 82% which should
completed damage of *Amoranthus retroflexus*, *Chenopodium album* and *Staria
viridis* at 500g ai/ha in per-mergence test.

![Chemical Structure](image)

(115)

Gienke Wolfgang et al. have synthesized N-triazinyl formines and
analogs of the type (116) as herbicides$^{88}$. [R$^1$=H, R$^2$=CHNOH, R$^1$, R$^2$=CHNMe$_2$,
CHC$_6$H$_4$Cl$^{-4}$].

![Chemical Structure](image)
Some new alkylamino-1,3,5-triazines of the type (117) and (118)

$[R^1=\text{(un) substituted alkyl, cycloalkyl}; R^2, R^3=H \text{ (un) substituted alkyl CHO etc}]$

$R^4=H \text{ (un) substituted alkyl, alkenyl etc. } R^5, R^6, R^7, R^8, R^9=H, \text{ halo, NO}_2 \text{ with provisions}] \text{ and their salts] were prepared as herbicides}^{89}.$
Thienocycloalk(en)ylamine-1,3,5-triazines of the type (119) have been synthesized by Kristain et al. as herbicides\textsuperscript{90}.

![Chemical structure of (119)]
(vi) FLUORINATED AZOLES INCORPORATING >N–C–S–MOIETY AS MEDICINAL COMPOUNDS:

Borhani, David W.; Calderwood, David J; et al. have recorded some novel imidazothiazoles and imidazoxazoles of the type (120) and (121) [X=O, S; A=C, N; D=O, N, NH and derivs; E=N, CR<sup>a</sup>; G=N, NH=derivs, CR<sup>c</sup>; Z=(un) substituted Ph, (un) substituted naphthyl, and (un) substituted heteroaryl; R<sup>a</sup>=H, NH<sub>2</sub> derivs; pyridinyl, C<sub>1–6</sub> alkyl; R<sup>c</sup>=H, NH<sub>2</sub> and derivs; (un) substituted CO-NH-C<sub>1–4</sub> alkyl, CO-C<sub>1–3</sub> alkyl, C<sub>2–4</sub> alkylamino etc. each R=independently H, F, Cl and C<sub>1–4</sub> alkyl, R<sup>d</sup>=H, halo, CN, SO<sub>2</sub>, CONH-C<sub>1–6</sub> alkyl, CON(CH<sub>3</sub>)<sub>2</sub> etc. n=1, 2,4] as anti-inflammatory and anti-proliferative disease<sup>91</sup>.

\[ (120) \] \hspace{2cm} \[ (121) \]
Pyrimidine derivatives as CXCR\(^2\) receptor of the type (122) [R\(^1\)= (un) substituted C\(_{6-18}\) aryl and (un) substituted C\(_{6-18}\) aryl-C\(_{1-4}\) alkyl; R\(^2\)=C\(_{1-8}\) (halo) alkyl amino and derivs, (un) substituted C\(_{6-18}\) aryl (un) substituted C\(_{6-18}\) aryl-C\(_{1-8}\) alkyl, hetero cyclyl etc. and their pharmaceutically acceptable salts and solvates thereof are claimed. Compound (123) was prepared and used as antagonist agents\(^9\)\(^2\).

![Chemical structure of (122)]

(122)

![Chemical structure of (123)]

(123)
Olesen, Preben Houlberg; Petersen et al. have prepared some new haloalkylsulfone substituted compounds of the type (124) \([m=0-2; \ X, \text{when present represents } CR^8:CR^9 \text{ or } C:C; R^1=(\text{un}) \text{ substituted heteroaryl}; R^2=H, \text{ halo, alkyl, etc.}; R^3=H, NH^2, NO_2 \text{ etc.; } R^4=H, \text{ halo, OH etc.; at least one substituted among } R^5-\]
\[R^7=SR^{12}, \text{ SOR}^{12} \text{ or } SO_2R^{12}, \text{ and the remaining substituents among } R^5-R^7=H, NO_2, \]
\[\text{CN etc.; } R^8, R^9=H, \text{ alkyl, cycloalkyl etc.; } R^{12}=\text{haloalkyl} \] are used in the treatment of diabetes. \(^93\)

![Chemical structure of (124)](image)

Recently some [(phenylpyrimidobenzazepinyl)-amino] methoxybenzoic acid derivatives of the type (125) \([R^1=\text{halo, aliph, fluoroaliph,} \]
\[\text{(un) substitute aryl, heteroaryl etc.; } R^2=F, \text{ Cl, Me, CF}_3, \text{ OH, OMe, OCF}_3, \text{ OEt,} \]
OCH$_2$CF$_3$] have been recorded by Claiborne, Christopher F; et al. as antitumor agents$^{94}$.

![Chemical structure](image)

(125)

Biggadike, Keith; Cooper et al. have synthesized some indazoles of the type (126) [$R^1=5$-fluoro-$2$-methoxy phenyl; $R^2=-NR^3R^4$; $R^3=H$; $R^4=H$, -CH$_3$-$CH_3$, -CH$_2$CH(CH$_3$)$_2$, etc.] were used in the treatment of inflammation, allergy, and skin diseases$^{95}$.
Recently some novel 5,7-disubstituted [1,3] thiazolo [4,5] pyrimidin-2(3H)-amine derivatives of the type (127) \([R^1=\text{Me or CF}_3; R^2=\text{halo, CN or alkyl, } R^3=\text{H or Me;} R^4=\text{H or Me;} n=0-2]\) have been prepared by Johansson, Rolf; et al. and used in therapy.\(^9^6\)

Guo, Yingping; Chen, Genhui; et al. have prepared some novel dithiolopyrrolones of the type (128) which were used in therapeutical purpose.\(^9^7\) \([\text{C}_{22}\text{H}_{14}\text{F}_6\text{N}_2\text{O}_4\text{S}_2, \text{Stereo : ns}]\)
Some tetrahydroisoquinoline compounds of the type (129) \([X=C(O); \]
\(R^1=\text{(un) substituted morpholino, pyrrolidino, piprazino, etc.}; \]
\(R^2=\text{heteroaryl,} \]
\(R^3=\text{aryl, heteroaryl, arylalkyl, or heteroarylalkyl}; \]
\(R^4=\text{H, F, Cl, Br, I, NO}_2 \text{ etc}] \) have
been prepared by Weber, Lutz; et al. as therapeutical agents\textsuperscript{98}.

![Chemical structure](image)

Egbertson, Melissa S; Stauffer, Shaun R.; et al. have recorded some
aryldiazaspiro [4,5] decadone derivatives of the type (130) \([X=\text{NR}^6, \text{ O or S}; \]
\(Q=\text{alkylene optionally substituted with halo, OH, CN, etc.}; \]
\(R^1 \text{ and } R^5=\text{H, } R^2=\text{H} \]
\(\text{(un) substituted alkyl, alkenyl, alkyne cycloalkyl, cycloalkenyl, aryl or heteroaryl;} \]
R⁴=H (un) substituted alkyl or alkenyl; R⁶=H (un) substituted alkyl, alkenyl, cycloalkyl, alkylaryl, or alkylheteroaryl] as anti-Alzheimer's agents⁹⁹.

(130)

Some new phenoxypyridine derivatives as HGFR inhibitors of the type (131) [R¹=(un) substituted azetidin-1-yl, pyrrolidin-1-yl, piperidin-1-yl, piperazin-1-yl, diazapan-1-yl, morpholin-4-yl or amino; R²-R⁶=independently H or F] were prepared by Nagai, Mitsuo, Matsushima, Tomohiro; et al. as anti-cancer agents¹⁰⁰.

(131)

Recently various heteroarylmethylthiazolecarboxamide derivatives of the type (132) and (133) [X=CH or N; Y=NH, O, S or CH₃N; Q=substituted
pyrazine or pyrazole; W=aryl, heterocycl, alkylene, -C(O)O- etc. R₁=H, alkyl, heteroaryl, hydroxyalkyl etc.; R₃=H, alkenyl, alkoxyalkyl, halo etc.]. Thus type (132) was prepared by N-alkylation of 4-methyl-2-(2H-pyrazol-3-yl) thiazole-5-carboxylic acid 4-fluorobenzylamide with 1-(2-bromoethyl)-4-methoxybenzene have been synthesized by Dales, Natalie et al. as stearoyl-CoA desturase inhibitors\(^{101}\).

\[
\begin{align*}
&\text{Q} \\
&\text{X} \\
&\text{Y} \\
&\text{W} \\
&\text{R}^1 \\
&\text{R}^3 
\end{align*}
\]

(132)

Cherrier, Marie-Pierre et al. have recorded new pyrazolylbenzimidazole derivatives of the type (134) \([R^1, R^4=\text{independently } H, \text{Me, Et, CO}_2\text{R}^a, \text{CH}_2\text{OR}^a, \text{OR}^a, F, \text{Cl, CONHR}^b, R^a=\text{(un) substituted cyclo/alkyl, (hetero) aryl; } R^b=H \text{ (un) substituted heterocyclo/cyclo/alkyl; } R^2, R^3=H, F, \text{OH and}}\)
derivs, NH₂ and derivs.; R⁵=NMeEt, NEt₂, pyrolidino, morpholino, cyclohexylamino etc.] as anti-cancer agents¹⁰².

(134)

Some heterocyclic non-nucleoside compounds of the type (135) [X=O, S, or NR⁴; R¹=(un) substituted pyridinyl, Ph, five-membered; R²=(cyclo) alkyl; R³=H, hydroxy alkyl, alkoxy carbonyl substituted alkyl, alkenyl etc; R⁴=H, (un) substituted aryl, benzyl, (cyclo) alkyl or alkenyl] were synthesized by Nan, Fajun; Zuo, Jianping; et al. as antiviral agents¹⁰³.

(135)
Maurin, Michael B.; Moore, James R., et al. have prepared crystalline efavirenz pharmaceutical compositions of the type (136) and used for treating HIV infections.\(^{104}\)

\[
\begin{align*}
\text{F}_3C & \text{C} & \text{C} \\
\text{N} & \text{O} \\
\text{O} & \text{C} & \text{C} \\
\text{(Ar)} & \text{CH} & \text{(X}^1\text{)} & \\
\text{N} & \text{N} & \text{X}^2 & \text{W}
\end{align*}
\]

(136)

New piperazines as N-type calcium channel blockers of the type (137) \([W=\text{(un) substituted (benz) imidazolyl, (benzo) thiazolyl ox (benz) oxazolyl;} X^1=\text{(un) substituted alkylene, alkenylene, alkynylene etc.;} X^2=\text{(un) substituted alkylene or heteroalkylene;} \text{Ar=\text{(un) substituted (hetero) aryl;} R=\text{O, halo, CN etc.;} n=1-4; m=0-1}]\) were recorded by Pajouhesh, Hassan; Ding, et al. used in the treatment of pain and other disorders.\(^{105}\)

\[
\begin{align*}
\text{(Ar)}_2\text{CH} & \text{---}(X^1)_m\text{---N---N---X}^2\text{---W}
\end{align*}
\]
Liu, Mo; Liu, Dengke; et al. have synthesized some of piperazine derivatives of the type (138) \([n=1-3, R^1=H \text{ or } C_1-C_6 \text{ alkyl; } R^2=\text{substituted NH}_2, R^3=H \text{ or substituted C}_1-C_6 \text{ alkyl; } R^4=\text{halogen; } R^5=(\text{halogen substituted}) C_1-C_6 \text{ alkyl}]\) as antibiotic agents\(^{106}\).

Various bicyclic pyrimidinone derivatives of the type (139) and (140) \([R^1=\text{un substituted arylalkyl; } R^2=H, \text{ alkyl, OH, alkoxy; } X, Y, Z=\text{CR}^8R^9\text{O(CH}_2)_1-3, \text{ CR}^8R^9\text{NR}^{10} \text{(CH}_2)_2-3; R^6=H \text{ and alkyl; } R^{10}=\text{CO}_2H, \text{ and derivs, COCO}_2H \text{ and derivs, CONH}_2 \text{ and derivs. acyl etc.}]\) have been recorded by Naidu, B. Narasimhulu; et al. and used in the treatment of HIV infection and AIDS\(^{107}\).
4,6-Di and 2,4,6-trisubstituted quinazoline derivatives of the type (141) [R²=H, NH₂, derivs and (un) substituted C₁−₇ alkyl; R⁴=C₁−₇ alkyl, C₂−₇ alkenyl, C₃−₉ cyclo alkyl, C₃−₁₀ cyclo alkenyl etc.; R=halo (un) substituted (hetero) aryl; Y is a single bond, C₁−₇ alkyene, C₂−₇ alkenylene, and C₂−₇ alkynylene; A is a single bond O, S, SO, SO₂, C₁−₇ alkyene etc.] were prepared by Gao, Ling-Jie, Herdewinj et al. as antiviral agents¹⁰⁸.

Malinka, Wieslaw; Kaczmarz; Mirela; et al. have synthesized some derivatives of pyridio [3,2-e]-1,2-thiazine 1,1-dioxide of the type (142) as analgesic agents¹⁰⁹.
Some substituted 3-amino-thieno [2,3-b] pyridine-2-carboxylic acid amide compounds of the type (143) \([R^1]=\text{partially halogenated } C_{1-6}\text{ alkyl optionally substituted with 1 to 2; } R^5, R^2, R^3\text{ and } R^4\text{ are independently selected from } H, -S(O)_n C_{1-6}\text{ alkyl, } NR^6R^7, OH, CF_3\text{ and } C_{1-6}\text{ alkyl; } R^5=OH, CO_2H; R^6\text{ and } R^6\text{ are independently selected from } H \& C_{1-6}\text{ alkyl; } n=0-1\text{] have been recorded by Ginn, John David, et al. and used in cardiovascular and inflammatory diseases}^{110}.
Shashikant R. Pathan et al. have synthesized 2-amino [5-(4-sulphonyl benzylidene)-2, 4-thiazolidinedione]-6-fluoro benzo thiazoles of the type (144) and anti-inflammatory agents\textsuperscript{111}.

![Chemical structure of 144](image)

(144)

Fluorinated thiazolo [4,5-d] pyrimidines and its derivatives of the type (145) have been prepared by Fahmy, et al. as anticancerous compounds\textsuperscript{112}.

![Chemical structure of 145](image)

(145)
Mark E; Schnute have prepared 1-aryl-4-oxo-1,4-dihydro-3-quinolines carboxamides of the type (146) (R\(^1\)=H, halo or C\(_1\)–C\(_4\) alkyl optionally substituted by 1 to 3 halo, R\(^2\)=H, halo, aryl; R\(^3\)=H, halo, OH, alkoxy, aryloxy etc. R\(^4\)=halo, OH, alkoxy aryloxy; R\(^5\)=H, halo, OH, alkoxy, aryloxy etc. Y=Cl, F, Br, CN or NO\(_2\) as antiviral agents\(^{113}\).

![Chemical Structure 146]

Hennquin, Laurent and Francies have reported benzodioxolyl substituted quinolines of the type (147) [Z=O, S, SO, SO\(_2\), etc.; M=1-4; R\(^1\)=halo, CF\(_3\), CN etc. n=1-3, R\(^3\)=halo, CF\(_3\), CN etc.] as antitumor agents\(^{114}\).

![Chemical Structure 147]
Waer et al. have synthesized poly-substituted pteridine diones (lumazines) of the type (148) 1,3-dimethyl-6-[(E)-2-(pyrid-3-yl)] lumazine as an antiviral agents\textsuperscript{115}. [R\textsuperscript{1}=H, alkyl, aryl, alkyl, aryl etc.; R\textsuperscript{2}=H, alkyl, aryl, alkyl, aryl etc; R\textsuperscript{3}R\textsuperscript{4}=H, F, I, alkyl etc; Y\textsuperscript{1}Y\textsuperscript{3}=O, S with provisions].

Demchenko et al. have synthesized 1,3,4-thiadiazolo [2,3-c] [1,2,4]-triazines of the type (149) [R\textsuperscript{1}=Ph, 2-MeC\textsubscript{6}H\textsubscript{4}, 4-FC\textsubscript{6}H\textsubscript{4}, Me\textsubscript{2}CH] as antiviral agents\textsuperscript{116}.
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